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1918a

MOTOR TRANSPORT CORPS

EXECUTIVE DIVISION
TRAINING BRANCH



WASHINGTON, D. C.
November, 1918



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U.S. Motor transport corps

**MOTOR TRUCK
OFFICERS' COURSE
OF THE
MOTOR TRANSPORT CORPS**

Field Work Lectures
Convoy Preparation
Administration

Theoretical Automobile Engineer-
ing
Military Instruction

LENGTH OF COURSE, TEN WEEKS

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MOTOR TRANSPORT CORPS
MOTOR TRUCK OFFICERS' COURSE

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MILITARY INSTRUCTION

GENERAL STATEMENT

DIRECTIONS FOR INSTRUCTORS

Underlying all successful instruction must be the realization on the part of each man called upon to teach in any subject that all instruction is given for the student, not for the instructor. Obviously, then, the success of a teacher must be measured by the amount of his teaching which is converted into working knowledge by his students. The job, then, for every member of the instructing staff at every school is to put his information across so that the members of the class get it and are able to use it.

The results obtained in frequent quizzes, oral test questions, or the performance of duties by the student, which require the application of material taught, are the fundamental measures of the success of the instructor in his work. Too much emphasis should not be placed on set written examinations, for a great deal of information may be acquired and used in a poll parrot manner, allowing a man to get high rating on a written examination, but a very low rating on any examination in which the student must apply the knowledge obtained in class room to the performance of a definite task.

The instructor should also bear in mind that men learn most things through one, or more, of three senses: hearing, sight and touch, and that that instruction will be the most successful which permits the student to learn in the most ways. Furthermore, some men learn best by hearing, others, by touch, and still others by sight, so that no one method can be used with maximum success for all.

Having the foregoing facts in mind, every instructor, in preparing his work for class presentation, should plan to use, to the fullest possible extent, in the class, pieces of equipment, such as: rifles, pack, equipment, parts of vehicle mechanism, such as axles, carburetors, spark plugs, or even whole chasses, if required, etc., etc. He should also use blackboards as much as possible for sketches, diagrams or definitions, etc., and should, so far as possible, insist that each student keep a note book on each subject, which must be neat in appearance and accurate in their statements. This will necessitate their inspection periodically, which should be done by the instructor or his assistants.

It will be seen that certain lectures are much shorter than would be required to fill the entire periods allotted to them. This is done purposely so that there will be an opportunity for the instructor to make up for lost time, occasioned by inspections, etc., etc.; or an opportunity for quizzes, special lectures, and such other work as the instructor may desire.

It will also be seen in the course for Motor Transport Company Mechanics that in places a four-hour period is devoted to certain lectures. This is done because the company mechanic must be a skilled workman and it is not enough for him to be informed on a subject; he must also be able to perform certain duties. The long lecture period permits reiteration, discussion and repeated demonstration on the part of the instructor, so that the student will get all details and be able to use his information. The instructor should use all his ability to put his ideas across in as many ways as possible to be sure that his class gets them thoroughly.

Instructors must look well to the discipline of their classes. Insistence should be placed on all students sitting in proper attitudes during class, and no lounging or otherwise careless appearance permitted. When an instructor enters the room, all students should rise and remain standing until ordered to be seated. They should also rise when an officer enters the room and remain

standing until otherwise directed. In short, strict military discipline should be insisted upon at all times by the instructor, and he should be especially careful that all his acts are also guided by the same precepts.

GENERAL STATEMENT

The lectures in this book are designed for the use of the instructors in the various subjects, and are written from that standpoint, following the curriculum outline in detail.

The material is put in this form for the use of instructors so that training at all schools may be uniform. Copies of this book are not to be used for student's text books, and where any material contained in this book is desired for students' use it is expected that it will be reproduced by mimeograph or otherwise.

The lectures are not to be read to the students, but are to give the instructors the subject matter to be covered, as well as the method of presentation.

The material given under Exercises is written in lecture form but is to be covered by informal discussion, or otherwise, as the instructor may feel to be desirable.

Under quizzes and written examinations are given typical questions, not formal examinations as such. It is expected that the instructor will use such of the questions as he may wish for his work, but the main intent in setting down the questions is to give the instructor a standard of values by the aid of which he should be able to make up his own questions as need arises.

It is planned to issue bulletins on training activities once a month, for the use of instructors at all M. T. C. training camps. These bulletins will be sent in quantities to the Commanding Officers of all M. T. C. Training camps, for distribution, to the instructing personnel.

It will be well for instructors who are teaching mechanical subjects to secure the Instructor's Guide for Company Mechanics' Course as there are many details of the vehicle mechanism and diagrams that will be helpful in any work of that character.

No lectures are written on Military Instruction as the plan is to follow the reference books closely and have only informal lectures, recitations and quizzes.

Where lectures are prepared for periods not stated as lecture periods in the curriculum, it is designed that the material covered by the lecture will be given in an informal way during the period assigned for the work.

Some lectures will be found to be longer than others, and some will be found too short to cover the entire period assigned. This arrangement is made purposely to permit leeway to compensate for the personal equations of the various instructors, as well as to allow for hours lost or shortened by various unforeseen circumstances. Where spare time is provided by this means it is to be used in bringing up the work, if behind schedule, or for review or quiz, if the work is on schedule.

MOTOR TRUCK DRIVERS

Instructors will become familiar with the duties of the truck driver and use every effort to impress upon such students just what their duties are and especially what they are not to do. It must be borne in mind that the driver does only the most elementary work on the truck, such as oiling and greas-

ing, tightening loose bolts and nuts, changing spark plugs, filling the radiator, tightening loose wires, draining the carburetor, etc. He makes no actual repairs of any magnitude on the motor, or vehicle, except under the direction of the company mechanic. In view of the foregoing, the instruction should be confined to making the driver familiar with the construction of his vehicle and the relation of its parts, but not technically proficient in anything but the most minor repairs. Time may well be spent in training him to diagnose motor troubles by their symptoms, together with an understanding of their causes, so that he may know just what the trouble is, the seriousness of letting it go unattended, and the probable time required to make the repairs. Training of *truck drivers* must be restricted by the foregoing consideration.

MOTOR CAR AND CYCLE DRIVERS

Motor Cars and Cycles operate as independent units, therefore the drivers must be taught not only the general mechanism, etc., of the vehicles, but also the road repairs and adjustments which are commonly made on vehicles by skilled operators. It is often impossible to get a mechanic for this work and the driver must be able to make repairs of such character as will be permanent, so the training of such men in maintenance, as well as driving, must be of a thorough nature.

MILITARY COURTESIES

It is designed that all students should be instructed in military courtesy and all commanding officers and senior instructors should have copies of the pamphlet on "Military Courtesies" published by the Training Branch, M. T. C., and see that all students are instructed in conformity with the directions therein contained.

The fact that an enlisted man completed a course in an M. T. C. School shall be recorded under "Remarks" on his Service Record, stating the course completed, the date and the general average of his work.

M. T. C. TRAINING PUBLICATIONS

The following material may be obtained in quantities as desired by application to the Chief, Training Branch, Motor Transport Corps, Washington, D. C.

A. Report Forms for Use in M. T. C. Courses.

1. Motor Transport Company Officers' Course, Forms M. T. C.-289 and M. T.-290.
2. Motor Transport Company Truckmasters' Course, Forms M. T. C.-291 and M. T. C.-292.
3. Motor Truck Drivers' Course, Forms M. T. C.-293 and M. T. C.-294.
4. Motor Car Drivers' Course, Forms M. T. C.-295 and M. T. C.-296.
5. Motor Cycle Company Officers' Course, Forms M. T. C.-297 and M. T. C.-298.
6. Motorcycle Drivers' Course, Forms M. T. C.-299 and M. T. C.-300.
7. Motor Transport Company Mechanics' Course, Forms M. T. C.-301 and M. T. C.-302.

- B. Tables of instructional personnel for schools of different sizes.
- C. Tables of equipment for schools of different sizes.
- D. Blank diplomas for awarding to students in officers' courses at the completion of their courses.
- E. M. T. C. Curriculum of Field Service Training.
- F. Tentative Manual of Training of the Motor Transport Corps.
- G. Instructors' Guide for Motor Transport Company Officers' Course.
- H. Instructors' Guide for Motor Transport Company Non-Commissioned Officers' Course.
- I. Instructors' Guide for Motor Transport Company Drivers' Course.
- J. Instructors' Guide for Motor Car Company Drivers' Course.
- K. Instructors' Guide for Motor Cycle Company Officers' Course.
- L. Instructors' Guide for Motor Cycle Company Drivers' Course.
- M. Instructors' Guide for Motor Transport Company Mechanics' Course.
- N. Curriculum and Lectures for the M. T. C. Administrative Officers' Course.
- O. Course in Military Courtesies.

MOTOR TRUCK OFFICERS' COURSE

Schedule of Classes

On the following pages is given, in tabular form, a schedule of class hours for the Motor Transport Company Officers' Course, basing it upon the requirements of the Curriculum.

All courses for officer students shall be of not less than ten weeks' duration, by direction of the General Staff, so a four week period of military and army instruction is given prefacing the purely M. T. C. instruction given in the last six weeks of the course. This is done in order that the student may become in a measure familiar with Army practices and drill, before he devotes the major part of his time to purely technical work.

It is to be understood that the schedule is subject to change, owing to local conditions, but it is given that it may afford a definite base of reference for all contemplated changes, necessitated by local conditions at the schools.

Should it be desired to operate two sections at one time one section could follow the schedule as given while the other section would take the afternoon schedule of classes in the morning, and the morning schedule in the afternoon. By such a combination the maximum use of instructors and equipment is obtained.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH
FIELD SERVICE TRAINING
MOTOR TRUCK SECTION
OFFICERS' COURSE—LENGTH TEN WEEKS

FIRST WEEK

Day	7 00-8 00	8 00-9 00	9 00-10 00	10 00-11 00	11 00-12 00	1 00-2 00	2 00-3 00	3 00-4 00	4 00-5 00	7 00-9 00
1			Organization of Company and Issue of Equipment							Study
2		Infantry Drill	Conference			Infantry Drill	Practice March			Study
3			Conference			Infantry Drill	Practice March			
4		Infantry Drill	Conference		Infantry Drill	Conference				Study
5		Infantry Drill	Conference		Infantry Drill	Conference	Practice March			Study
6		Inspection	Infantry Drill Regulations Written Exam.							

SECOND WEEK

7		Infantry Drill	Conference		Infantry Drill	Conference				Study
8		Infantry Drill	Conference		Infantry Drill					Study
9		Infantry Drill	Conference		Infantry Drill	Conference				Study
10		Infantry Drill	Conference		Infantry Drill	Practice March				Study
11		Infantry Drill	Conference		Infantry Drill	Conference				Study
12		Inspection	Infantry Drill Regulations Written Exam.							

THIRD WEEK

13		Infantry Drill	Conference		Infantry Drill					Study
14		Infantry Drill	Conference		Infantry Drill	Conference				Study
15		Infantry Drill	Conference		Infantry Drill					Study
16		Infantry Drill	Conference		Infantry Drill					Study
17		Infantry Drill	Conference		Infantry Drill			Infantry Drill Regulations Written Exam.		Study
18		Inspection	Infantry Drill Regulations Written Exam.							

FOURTH WEEK

19		Infantry Drill	Conference		Infantry Drill					Study
20		Infantry Drill	Conference		Infantry Drill					Study
21		Infantry Drill	Conference		Infantry Drill					Study
22		Infantry Drill	Conference		Infantry Drill					Study
23		Infantry Drill	Conference	Infantry Drill Regulations Written Exam.	Infantry Drill					Study
24		Inspection	Infantry Drill Regulations Written Exam.							

FIFTH WEEK

25	Infantry Drill	Theoretical Auto Engineering Lecture I	Study or Conference	Administration Lecture I	Field Work Lecture I	Evening Coconvoy by Assignment
26	Infantry Drill	Theoretical Auto Engineering Lecture II	Preparation for Convoy	Convoy Exercise I		
27	Infantry Drill	Theoretical Auto Engineering Lecture III	Study or Conference	Administration Lecture II	Field Work Lecture II	
28	Infantry Drill	Theoretical Auto Engineering Lecture IV	Preparation for Convoy	Convoy Exercise II		
29	Infantry Drill	Theoretical Auto Engineering Lecture V	Study or Conference	Administration Lecture III	Field Work Lecture III	
30	Infantry Drill	Theoretical Auto Engineering Lecture VI	Preparation for Convoy	Convoy Exercise III		

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH
FIELD SERVICE TRAINING
MOTOR TRUCK SECTION
OFFICERS' COURSE—LENGTH TEN WEEKS

Continued

SIXTH WEEK

Day	7.00-8.00	8.00-9.00	9.00-10.00	10.00-11.00	11.00-12.00	1.00-2.00	2.00-3.00	3.00-4.00	4.00-5.00	7.00-9.00
31	Infantry Drill		Theoretical Auto Engineering Lecture VII		Study or Conference	Administration Lecture IV		Field Work Lecture IV		Evening Convoy by Assign- ment
32	Infantry Drill		Theoretical Auto Engineering Lecture VIII		Preparation for Convoy	Convoy Exercise IV				
33	Infantry Drill		Theoretical Auto Engg. Lecture IX	Practical Auto Engg. Exercise I	Study or Conference	Administration Lecture V		Field Work Lecture V		
34	Infantry Drill		Theoretical Auto Engineering Lecture X		Preparation for Convoy	Convoy Exercise V				
35	Infantry Drill		Theoretical Auto Engg. Lecture XI	Practical Auto Engg. Exercise II	Study or Conference	Administration Quiz		Field Work Lecture VI		
36	Infantry Drill		Theoretical Auto Engineering Lecture XII		Preparation for Convoy	Convoy Exercise VI				

SEVENTH WEEK

37	Infantry Drill		Theoretical Auto Engineering Lecture XIII		Study or Conference	Administration Lecture VI		Field Work Lecture VII		Evening Convoy by Assign- ment
38	Infantry Drill		Theoretical Auto Engineering Lecture XIV		Preparation for Convoy	Convoy Exercise VII				
39	Infantry Drill		Theoretical Auto Engineering Lecture XV		Study or Conference	Administration Lecture VII		Field Work Lecture VIII		
40	Infantry Drill		Theoretical Auto Engineering Lecture XVI		Preparation for Convoy	Convoy Exercise VIII				
41	Infantry Drill		Theoretical Auto Engineering Lecture XVII		Study or Conference	Administration Lecture VIII		Field Work Lecture IX		
42	Infantry Drill		Theoretical Auto Engg. Lecture XVIII	Practical Auto Engg. Quiz	Preparation for Convoy	Convoy Exercise IX				

EIGHTH WEEK

43	Infantry Drill		Theoretical Auto Engineering Lecture XIX		Study or Conference	Administration Lecture IX		Field Work Lecture X		Evening Convoy by Assign- ment
44	Infantry Drill		Practical Auto Engineering Exercise III		Preparation for Convoy	Convoy Exercise X				
45	Infantry Drill		Practical Auto Engineering Exercise IV		Study or Conference	Administration Lecture X		Field Work Lecture XI		
46	Infantry Drill		Practical Auto Engineering Exercise V		Preparation for Convoy	Convoy Exercise XI				
47	Infantry Drill		Practical Auto Engineering Exercise VI		Study or Conference	Administration Quiz		Field Work Lecture XII		
48	Infantry Drill		Practical Auto Engineering Exercise VII		Preparation for Convoy	Convoy Exercise XII				

NINTH WEEK

49	Infantry Drill		Practical Auto Engineering Exercise VIII		Study or Conference	Administration Lecture XI		Field Work Lecture XIII		Evening Convoy by Assign- ment
50	Infantry Drill		Practical Auto Engineering Exercise IX		Preparation for Convoy	Convoy Exercise XIII				
51	Infantry Drill		Practical Auto Engineering Exercise X		Study or Conference	Administration Lecture XII		Field Work Lecture XIV		
52	Infantry Drill		Practical Auto Engineering Exercise XI		Preparation for Convoy	Convoy Exercise XIV				
53	Infantry Drill		Practical Auto Engineering Exercise XII		Study or Conference	Administration Lecture XIII		Field Work Lecture XV		
54	Infantry Drill		Practical Auto Engineering Exercise XIII		Preparation for Convoy	Convoy Exercise XV				

TENTH WEEK

55	Infantry Drill		Practical Auto Engineering Exercise XIV		Study or Conference	Administration Lecture XIV		Field Work Lecture XVI		Evening Convoy by Assign- ment
56	Infantry Drill		Practical Auto Engineering Lecture XV and Quiz		Preparation for Convoy	Convoy Exercise XVI				
57	Infantry Drill		Practical Auto Engineering Exercise XVI		Study or Conference	Administration Lecture XV		Field Work Lecture XVII		
58	Infantry Drill		Practical Auto Engineering* Exercise XVII		Preparation for Convoy	Convoy Exercise XVII				
59	Infantry Drill		Infantry Drill Written Examination			Practical Auto Engineering, Exercise XXIII Written Examination				
60	Infantry Drill		Administration Written Examination			Field Work Written Examination				

*Exercises XVIII to XXII Inc., Practical Auto Engineering, not listed are to be given at the discretion of the instructor by special assignment.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
FIELD WORK

LECTURE I

GENERAL ORGANIZATION, M. T. C.

The purpose of these lectures is to acquaint the men of these classes with the organization of the Motor Transport Corps and the method of operation of the Service of Supplies and its subdivisions.

Men can become more efficient in the performance of their duties when they have a complete understanding of just what is required of the service to which they are attached and the duties they bear to that service as individuals.

When a member of this class realizes that he is an important cog in a wheel he can understand that as a cog, he might be required at any time to play an important part in the success of some operation undertaken by our Army. There is only one way to be sure that he will be able to perform his duty when called upon, and that is by paying the very closest attention to lectures and instructions given here.

It was the Camion Service (Motor Transport Corps of the French Army) that saved the day at Verdun. When the German advance on this fortress started it was practically gutted. Supplies had to come up if the city was to be held. The Camion Service was called upon to meet the condition and because it was efficient and functioned with perfect discipline and understanding, the city was saved. Our own service played an extraordinary and decisive part at Chateau-Thierry in the support of the Marine Corps. This is the kind of effectiveness we must be able to deliver when we are called upon, perhaps under the worst conditions. Efficiency should ever be the watchword of the M. T. C., because it is the organization that "delivers the goods."

The Motor Transport Corps is a new branch of the service only so far as the name is concerned. There have always been lines of communications, Service of Supply, etc. When all is summed up there are only two services or divisions of an Army, no matter how large or how small, one for operations and the other for maintenance and supply. In other words, any army unit is either actually used in an operation or to maintain and supply one.

The chart shows the general organization of the A.E.F. and what bearing our service has to the other branches. First, there is the Commander-in-Chief, General Pershing. Then come the Chief of Staff, the Deputy Chief of Staff and the Assistant Chiefs of Staff who are the heads of various branches of the Service, operating, or maintenance and supply. You will notice that the chart shows that the two divisions of the army are combat and S.O.S. For the better understanding of the lectures to follow, adopt these terms as standard.

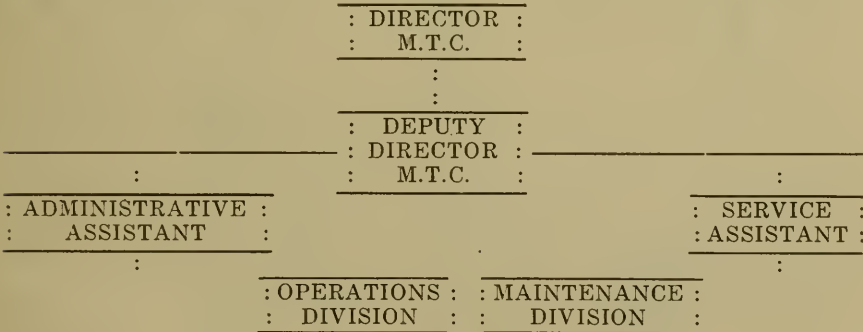
The S.O.S. extends from the base, which is a port, to what is known as the Zone of the Army. The S.O.S. is subdivided into six Base Sections, an Intermediate Section and an Advance Section, the commander in charge of each

of the above sections being responsible to the general commanding the S.O.S., who is, in turn, responsible to the Commander-in-Chief.

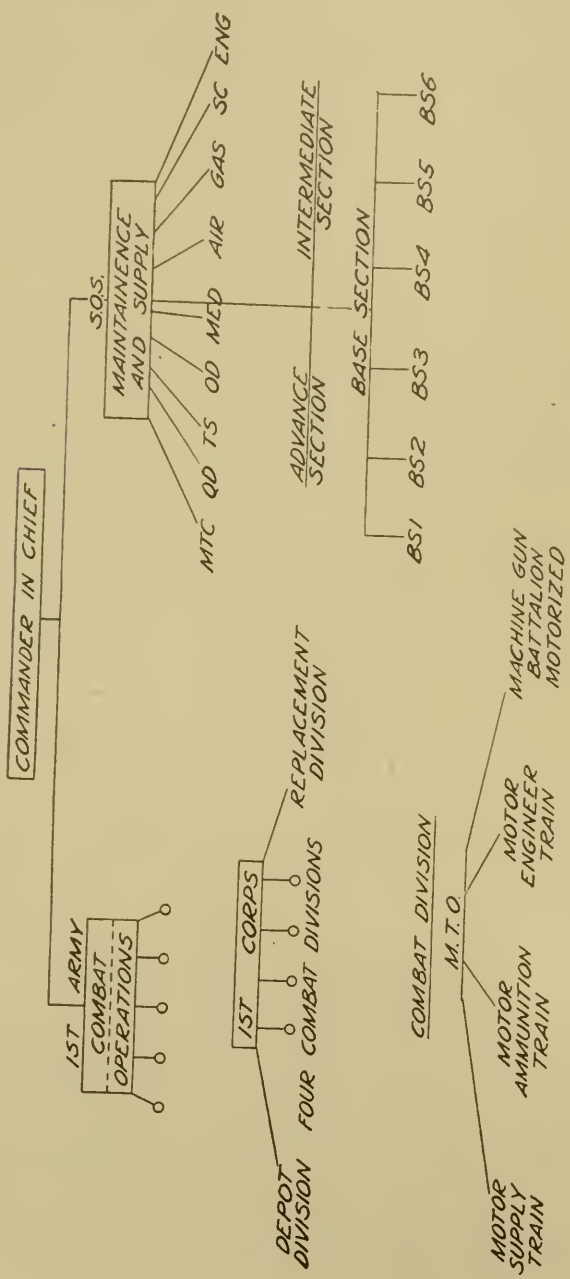
Now for a word in explanation of the figures shown on the A.E.F. Organization Chart. Combat troops are those actually fighting in the zone of the army or zone of the advance, such as all men in trenches supporting the artillery, the supply, ammunition, engineer and motorized machine gun battalions, all of which are attached either to a combat Army Corps or Division. On the other side we have the Maintenance or Supply, known as the S.O.S. It is the duty of the S.O.S. to furnish all the material and equipment to the combat elements. Grouped under this service are the Motor Transport Corps, Quartermaster Corps, Transportation Service, Ordnance Department, Medical Corps, Air Service, Chemical Warfare Service, Signal Corps, and Corps of Engineers. These are the main branches of the S.O.S.

In the diagram showing the divisions of the first army, you will notice that there are five Army Corps and that under each army corps there are four combat divisions, one depot, and one replacement division. A Motor Transport officer is attached to each division in charge of all motor vehicles and motorized organizations serving the division. All trucks of the S.O.S. may at any time be called upon by this officer to proceed wherever they are needed, irrespective of the branch of the S. O. S. to which they belong. For example, if a troop movement is necessary a truck in the supply service could be utilized for the purpose temporarily, as provided for in General Orders No. 74 A.E.F.—1918.

At Headquarters Service of Supply is the Director or Chief of the Motor Transport Corps, A.E.F. As an assistant there is a Deputy Director M.T.C., and in addition an administrative assistant in charge of all administrative matters, and a service assistant, who is the technical man and advisor, the chief inspector and co-ordinator of the M. T. C. Following is a chart showing the above organization:



You will see at a glance that the organization of the M.T.C. is very similar to that of the A.E.F. inasmuch as it adheres to the two classifications of service, one being operation, the other maintenance. First we have the Operation Division which has charge of every Motor Transport working in the Service of Supply, and also exercises a technical supervision over all motor transport units of the A.E.F., whether serving combat troops or in the supply service. Second we have the Maintenance Division of the M.T.C. which has charge of the upkeep of all motor vehicles, supplies and spare parts. It sees to all repairs except those small ones handled by the company in the field, at the following M.T.C. Parks:



A.E.F.
CHART OF ORGANIZATION

1. The Service Park, which is nothing more or less than a truck equipped with a lathe, a drill press, etc.
2. The Overhaul Park, which handles the heavier repairs.
3. The Reconstruction Park, which handles all the salvaging and re-building of trucks, motor cars and motorcycles.

The Operations Division has charge of motor transport units serving the S.O.S. and exercises a technical supervision over all motor transport units in the A.E.F., whether serving the combat troops or the supply. Motor Transport Corps officers and noncommissioned officers are trained to be either operating men or maintenance men, and will be listed upon arrival in France under one of these two classifications.

The road work is sometimes more important than the maintenance work, because material in France is worth about three times as much as it is in America. A truck worth \$5,000 here is worth the equivalent of \$15,000 or \$20,000 in France. A screwdriver, monkey wrench, spark plug, or any piece of material has the same relative increase in value. When the officers and noncommissioned officers have trained their men to operate motor vehicles with this in view they have accomplished a great deal of their work.

The quickest way to accomplish this result is to have discipline both in camp and on the road. Discipline does not mean that every time an officer comes in sight the men have to stand like stone images, and when the officer's or noncommissioned officer's back is turned, slump back carelessly. It goes deeper than that. Discipline in the French and British armies is so perfect that a man who is told by his commander to observe a list of "do's" and "don't's" will do so. A man told that he is to clean and grease certain parts of his truck every day, or that he is to run his truck at a certain speed, will obey the order whether or not the officer is present.

The sooner you instil into our drivers this idea of discipline, the more efficient you make the service. The place to do this is right here while the man is in training. See that a driver keeps the proper distance in convoy. See that he keeps to the right of the road. See that his behavior and his actions are irreproachable.

As regards discipline, the convoy formation on the road is just the same as an infantry unit marching. A truck operates on the road alone. The corresponding unit in the infantry is a soldier. Before a man can drill in company formation he must be taught to drill alone. After that he is taught the school of the squad and later to drill in company formation. In the same way a man must be taught to drive his truck alone as a unit. Then he can go into a section. When he can operate properly in a section, he should be able to operate in company formation. When the company commander has his sergeants and men so trained that they can operate in a company, they go into train formation. When the train can operate properly, the train commander is called upon to have his train take part in group formation of two or more trains.

Last November a truck company in France operated in a movement of troops from central France up to Peronne. There were 5,000 trucks on the road. They were gone two weeks and had four hours' notice to prepare for the trip. None of the men in the American companies knew anything about long troop transports, but they learned a great deal before the two weeks were up. Because of their ignorance concerning troop transports and how to operate in a large formation, these men delayed the whole movement. There were men driving trucks who insisted on doing everything but the right thing. There were more sergeants "broken" and more court-martials after that

transport than in all other months. They had been told, in some cases in a half-hearted way, that they should not do this and should not do that, and most of the companies had never been disciplined properly. It was a big lesson for the unprepared ones, and proved that the mainstay of the Motor Transport organization is strict discipline at all times, whether on the road or in camp.

Field work changes every now and then with conditions. For instance, until this spring most of our work had been for trench warfare, but open warfare in the spring drive became the sensation of the hour. There is practically no more trench warfare, a condition that has greatly changed the transportation question. If trench warfare returns, we shall have to adjust ourselves again. You may get instructions from time to time to change this or that, but the fundamental things will not alter. These have been worked out for four years and are permanent; for instance, distance between trucks, signals, oiling and greasing rules, etc.

You may think that sometimes we insist upon rules and regulations which seem useless, but when you get to France these are all useful and obligatory. If we prescribe certain distances going through towns and insist that you keep on the right hand side of the road while training here, remember you are training for service on the other side. This applies to many of our training rules. The aim is always the same—to make our men efficient for overseas, and to teach them to think in terms of the Motor Transport Corps in the A.E.F.

MOTOR TRANSPORT CORPS

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LECTURE II

CONVOY THEORY AND RULES

Subjects treated in this lecture include convoy theory and rules, the similarity between motor vehicles and infantry troops marching, and the need for co-ordination through discipline and formation.

RULES OF THE ROAD

During the past four years of war the motor transport service of the allied armies has developed a number of very strict rules and regulations dealing with road distances, rates of speed, etc. The M.T.C. of the American army has attempted to combine this previous experience with its own experience and has adopted similar regulations. The distances to be maintained by vehicles operating in convoy in the A. E. F. are the following:

Between vehicles on the road outside of cities, villages and towns at average speed; 20 yards or 3 truck lengths.

Between sections on the road outside of cities, villages and towns at average speed; 40 yards or 8 truck lengths.

Between vehicles passing through cities, villages and towns at average speed; 5 yards or 1 truck length.

Between sections passing through cities, villages and towns at average speed; 25 yards or 5 truck lengths.

Between vehicles halted; 5 yards or 1 truck length.

Between sections halted; 15 yards or 3 truck lengths.

These distances may, of course, be modified under exceptional conditions. For instance, if a truck company operating at the front is subjected to bombardment, either by aviators or artillery, the officer or noncommissioned officer in charge immediately gives orders for the convoy to spread out, taking distances of from 100 to 150 yards between vehicles. This is done for the same reason that an infantry company, when subject to shell fire, deploys into extended order to scatter the target over a greater area.

A convoy ascending or descending a hill must increase the distance between trucks to lessen the danger of collision in case a truck should temporarily become uncontrollable on a hill. Upon approaching a hill the first trucks of a convoy should speed up to avoid "jamming" at the approach to the hill. Likewise, the first few trucks should slow down after coming down a hill until proper distances are again attained.

Upon approaching a town the first truck of a convoy should slow down to allow the rest of the trucks to close up to the proper distance for passing through towns. Likewise the first truck should temporarily increase its speed upon leaving a town to permit the remaining trucks to take their correct road distance without slowing down the speed of the entire convoy. The

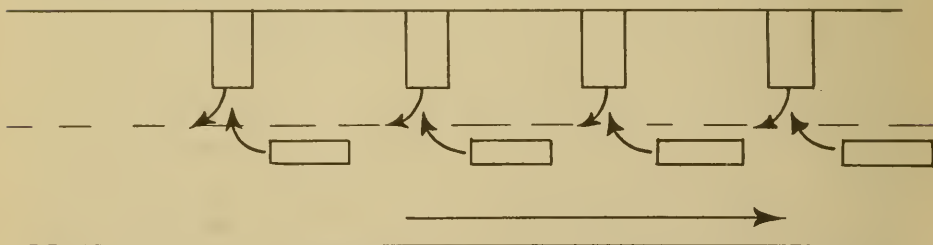
speed of a convoy is taken from the last truck, while the proper road spacing is taken from the first truck.

The proper starting and stopping of a convoy should be given a great deal of attention during the training period.

All vehicles in a section should start at the same time. When starting, vehicles should not exceed a speed of more than two or three miles an hour for the first 100 yards so that the vehicles may take their proper distances on the road. A section should not start until the Section Commander has assured himself that all vehicles are ready to start. This can be determined by vocal, visual, and whistle signals.

All vehicles of a convoy should stop gradually, pulling well over to the right hand side of the road while reducing speed, the assistant driver giving the signal "Halt" to the vehicle behind. When a convoy stops, the proper distances between vehicles and sections will be maintained. Care should be taken not to block streets, cross-roads or road forks.

One signal which is not mentioned in the manual, as you may not use it very frequently, is the signal for reversing. The signal for reversing in case you are attacked by shell fire, is to swing your right arm high above your head in wide circles and blow the whistle as hard as you can. This is a sign for the whole convoy to turn around as fast as possible. The best way to train the outfit to execute such a movement is to instruct them that immediately after the sig-



Method of Reversing Direction of Travel, and at the Same Time Keeping Road on Right

nal is given they should back up, turn and pull around in the reverse direction. If the road is not wide enough they may have to steer their trucks until they have them in the proper direction, but ordinarily they can turn around. It is advisable to practice these moves. Every truck must back in the same direction and at the same time, to get away as quickly as possible. This is essential because the slightest irregularity is apt to cause confusion.

In order to facilitate transportation, the following road rules and practices must be adhered to:

The question of passing vehicles on the road, or as it is known, "doubling" another vehicle, is a matter of great importance, and rules for doubling must be strictly observed by all. The following are a few of the most important: In villages never double vehicles going in the same direction. A slower moving convoy must never be doubled unless the doubling can be done without confusion. Never double a halted convoy, a halted body of troops, or a body of troops moving in the same direction without first getting the permission of the officer in charge of the convoy or the troops to be doubled.

The foregoing rules for doubling do not apply to vehicles operating on military police roads or what are known as "*routes gardees*." These are the main thoroughfares at the front and it is absolutely forbidden for one truck to double moving vehicles proceeding in the same direction. Touring cars, motorcycles, and light delivery trucks, such as Fords, Dodges, etc., may double other vehicles when the traffic on the road will permit such doubling. The rule that a convoy cannot double another convoy on routes gardees must be strictly obeyed to eliminate congestion on the main thoroughfares behind the front.

All signs and notices posted on the routes gardees must be strictly obeyed. All instructions given by road guards, whether they contradict the driver's instructions or not, must be complied with. Never stop your vehicle on a route gardee. If a vehicle breaks down, it must be moved by towing or other means well to the right of the road; if possible, completely off the road. Turning around on a route gardee is prohibited. One-way roads marked "*sens unique*" are very common at the front, and going in any direction except the direction indicated by the road signs is absolutely forbidden.

Additional road rules which have been complied with are as follows:
When a convoy is stopped, all men must keep off the road.
The convoy must be kept together.

Drivers must at all times keep in touch with the truck immediately behind them, as the truck behind is the truck that governs the speed of the convoy.

A driver will never abandon his vehicle except by order of his Commanding Officer.

The use of a muffler cut-out is absolutely forbidden at all times.
Motors must not be left running more than one minute when the vehicle is standing.

Always give appropriate signals when changing direction or stopping.
Do not smoke while driving.
Do not allow unauthorized persons to ride on your vehicle.
In descending a steep hill, use the engine as brake by shifting to a lower gear.

When stopped on a hill, put a block under the rear wheel.
Pay attention to road signs and signals.
Except in cases of emergency, no person except the driver regularly assigned to it may drive any motor vehicle.

Never under any circumstances, fill the gasoline tank or work on the carburetor in the presence of a naked flame or an oil lantern. Use an electric torch.

One of the most practical ways to avoid accidents, damages to vehicles and property, and thereby unnecessary congestion and delay, is to drive at a sensible rate of speed. The maximum speed limits are the result of previous experience which has taught the military authorities that the speed of vehicles operating on military roads must be held down. The following maximum speed limits are therefore rigidly adhered to in France:

IN CITIES AND VILLAGES

Trucks.....	8 miles per hour
Passenger cars, ambulances.....	10 miles per hour
Motorcycles.....	10 miles per hour

ON OPEN ROADS OUTSIDE CITIES AND VILLAGES

Trucks.....	12 miles per hour
Ambulances.....	14 miles per hour
Passenger cars and motorcycles.....	35 miles per hour

When conveying on narrow winding roads which pass through forests or are so artificially camouflaged that it is difficult to observe anything very far in front or rear, an additional system for keeping in contact has been devised.

For instance: Imagine a convoy passing along such a road. There is a sharp bend immediately followed by a fork in the road. The company staff car has preceded the convoy and the officer has determined which road to take. It is necessary for him to precede the convoy. The first truck of the convoy has arrived at the fork of the road, while the second truck of the convoy is not in sight. It is clear that if the first proceeds, it will be impossible for the second truck to determine which road the convoy has taken. In a case like this, it is customary for the first truck to slow down or stop long enough for the second truck to come into view and to allow its driver to see which direction the convoy has taken. Then the first truck will proceed, and the second truck will wait at the fork of the road for the third truck, and so on down through the convoy.

Another practical way of keeping contact under such conditions is to station the second driver of the the first truck at the fork of the road, instructing him to direct the trucks to take the correct road and to get on the last truck on the convoy and continue with the company.

In case the road referred to is under heavy bombardment, the latter method is by far the most practicable and safest for keeping in contact, because it is not advisable to delay any length of time on a road under shell fire. Nevertheless, in cases like this, it is impossible to lay down definite rules and regulations and it is up to the company commander to use his own judgment.

The noncommissioned officer alone is responsible for success or failure with a "split convoy." In such a case a convoy is divided into groups of different sizes and each group is sent to a different place in charge of a truckmaster or assistant truckmaster.

The noncommissioned officer is thrown entirely on his own resources. It is unlikely that he can communicate with his commanding officer during the entire day. He must provide for all the needs of his section. When the section arrives at a park, he must make arrangements for loading and unloading, mess, etc., and here, as on the road, he must act on his own responsibility.

The importance of the foregoing is apparent when it is considered that approximately three-fourths of all our convoys in France are operated as split convoys.

At this point it is also well to remember how important a knowledge of French is to the truckmaster and his assistants. We receive most of our engineering material and a great deal of our supplies and ammunition from the French. In another lecture will be given the most necessary English words and their equivalent in French. Some of the common terms should be learned, especially words and phrases relating to automobiles. If you know how to ask a French driver if he has a spark plug, a jack, or other tool when you are stalled on the road, it may save you a great deal of trouble. Learn the French terms for automobile parts, ammunition supplies and different material, and get acquainted with the phrases used in everyday life.

If a convoy is shelled on the road, it is the first duty of the noncommissioned officer to save the trucks entrusted to his care. He must make this his primary object.

It is usually advisable to put the company mechanic on the last truck of the section, as the convoy may be split en route. Very often a section arrives at a park to load, and the noncommissioned officers have to take three trucks to a certain place, five to another place, and the rest to still other places. Under these circumstances it is advisable to put the three trucks in the first section under an assistant truckmaster, the five trucks of the next section also under an assistant truckmaster, and form the rest into a third very large section, in charge of the truckmaster. With this arrangement a noncommissioned officer is directing each group. This plan should always be used in similar cases, as it is imperative to have a noncommissioned officer in charge of each independent group of trucks. Where only one truck is concerned a good driver able to read road maps should be entrusted with it.

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LECTURE III

CONVOY RULES

The first thing we will take up today will be convoy rules: distance, signals, etc. Convoy rules are simple and few in number; every officer, noncommissioned officer, and enlisted man in the M. T. C. *must* know the road rules. The failure of any man in a crisis would stop the entire train, and might mean the loss of hundreds of lives.

The convoy rules are as follows: The distance between vehicles in close formation is 7 yards, or one truck-length; between sections 20 yards or 3 truck-lengths; between companies 40 yards or 6 truck-lengths; between trains 60 yards or 9 truck-lengths. The distance between vehicles in open formation is 20 yards or 3 truck-lengths; between sections 40 yards or 6 truck-lengths; between companies is 80 yards or 12 truck-lengths; between trains 100 yards or 15 truck-lengths. The distance between vehicles in halted formation is the same as in close formation.

These rules are at the prescribed speed, which will be taken up later.

Exceptional circumstances may justify modifications of road rules, for example, if a truck is under shell fire, or bombardment by aviators or artillery, the commanding officer or noncommissioned officer in charge immediately orders the vehicles to separate to distances of 100 to 150 yards. The reason for this is the same as spreading an infantry company under shell fire, deployment into extended order for the purpose of scattering the target over a wider range. The distance will also change slightly going down grade; that is, the distance may be increased to avoid collisions. The leader should accelerate, allowing more space between trucks, but care should be taken that this does not throw the entire train or company out. The leading truck should slow up after descending, and then get the proper distance.

Signals are one of the most important factors in convoy. The following are the proper signals to be used in all cases except where conditions necessitate the use of verbal signals:

ATTENTION: The whistle signal for attention is several short blasts of the whistle. The arm signal, the right hand from the wrist moved sharply from side to side above the head.

When the attention signal is given the assistant driver assumes the position of a soldier at attention just back of the left front hub, facing the head of the column.

The truckmaster takes position two yards to the left of the front wheel hub of the leading truck in the first section.

The assistant truckmaster in the first section takes position 1 yard to the left of the front left hub of the second truck in his section. The assistant truckmasters of sections 2 and 3 stand one yard to the left of the front left wheel hub of the first trucks in their section.

The chief mechanic takes position 1 yard behind the assistant driver of the repair truck.

The assistant mechanics take position 1 yard behind the assistant drivers of the last trucks in the first and second sections.

The signal *attention*, we must remember, is a command just as much as it would be in an infantry formation, therefore we must have the same snap in executing it. When signal is given every assistant truck driver in the company should, without loss of a second, jump to the ground without touching the vehicle; that is, he should not and *must not* slide down the side in a sluggish manner. There is nothing that shows lack of discipline more than to see the assistant drivers jumping off the trucks at different times. The 27 assistant drivers should come to *attention* and move as one man.

In convoy formation on the road the driver does not move, but sits erect in his seat until the signal *crank motors* is given. This is the only time the driver does not take his regular position of *attention* on the ground.

Crank Motors.—The whistle signal for *crank motors* is two long blasts. The arm signal, circles described in front of the body with right hand.

At this signal the assistant driver who is standing at *attention* goes to the front of the truck and cranks the motor with the *left hand*. This is also a command and must be carried out with smartness and snap. When the command *crank motors* is given the driver turns on the switch. When the motor starts the driver places the gear shift in first speed. While the driver is doing this the assistant driver takes his place on the running board of the vehicle. As soon as the assistant driver is sure that the truck is in first speed and ready to move he raises his left arm 45 degrees from a vertical position; by doing this he notifies the assistant truckmaster that the truck is ready to move. When all the arms are raised in his section, the assistant truckmaster raises his left arm and faces the truckmaster, awaiting the signal to move.

The whistle signal *forward* is one long blast. The arm signal is: the right arm raised over the head and lowered to a horizontal position in front of the body. The movement of the arm indicates the direction of travel:

Right here let us emphasize that all signals must pass through the following channels: the company commander gives his orders to the truckmaster, the truckmaster passing them on to the assistant truckmaster, the drivers picking them up from him. This is very important and the company commander should see that it is carried out in a manner just described.

The driver *does not* take the signal from the truckmaster or commanding officer, but from the assistant truckmaster who is in charge of his section.

When the assistant truckmaster gives *forward*, the drivers engage the clutch, and all the vehicles start at the same instant.

Speed up: no whistle signal, but the forearm is carried to the shoulder and the hand rapidly thrust upward several times. This signal should be used only when necessary, as it is likely to cause more or less confusion.

Slow down: no whistle signal. Arm extended upward and to the side at an angle of 45 degrees, and the hand moved up and down from the side. The truckmaster gives the signals and the assistant truckmasters take them from him; then the assistant truckmasters pass them on.

Shut off motors: two short and one long blast of the whistle. Arm signal: the arms crossed in front of the body at the waist, and moved sharply from side to side. The truckmaster gives the signal and the assistant truckmasters pass it on to their respective sections. Care should be taken to give the hand signal just as stated and that every man in the company understand it thor-

oughly, since the hand signals are used under certain conditions without any whistle.

Reverse convoy: the whistle signal is several short and one long blast. The arm signal: the truckmaster describes large circles above the head with the right arm. The assistant truckmasters pass the same signal to the assistant drivers, who then jump out and get in front of the truck, giving the back-up signal, which will be taken up later in the lecture. The driver stops the vehicle, puts it in reverse, and backs truck to the left of the road. The wheels are cramped to the right. The first speed is engaged and the trucks move around and forward to the right side of the road, taking up the prescribed distance. At the completion of this movement the company will be in a reversed position. It will be necessary to change the markers so that they will be in the proper place. The company proceeds without further orders when trucks have reached their places.

Back up is an arm signal. The forearms raised vertically, hands in front of and opposite shoulders, arms moved forward horizontally in the direction the trucks are moving. The palms held toward the trucks is signal to back; back of hands toward the trucks indicates signal for forward movement.

Care should be taken with this signal that every man moves his hands in the same way. This will take some training as the men are inclined to slur the signals, substituting their own ideas of how it should be done. It is very hard for the driver to know just how he is to move his wheels unless the signals are correctly given. If the men are well trained and work together, the driver and his assistant can back the truck in small space and difficult places. The correct signal will be found in the M.T.C. regulations and in the Advance Notes.

The driver should never look around while backing his truck. Verbal signals may be used at night.

Assemble: One long, one short, one long blast of the whistle. The arm signal: Truckmaster takes his position at the head of the column of trucks, on flank, where assembly is to be made, and describes small circles above the head. This should not be confused with the reverse convoy signal; the only difference is the size of the circles.

It is the duty of the company commander to see that these signals are carried out just as they are described in regulations, and to allow no signals to be used that are not authorized. Unauthorized signals invariably cause trouble and confusion.

The general purpose of the motor convoy is the efficient transport of personnel and material. The success of all convoys depends upon the proper functioning of the vehicles, the training and discipline of the personnel, and the exactness and initiative displayed by officers in the performance of their duties.

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LECTURE IV

ORGANIZATION OF MOTOR TRANSPORT COMPANY

The duties of a company officer on the road are many. He must be on the watch at all times, because the success of the entire company depends upon the manner in which he conducts his men and company. His duties are different from those of officers in other branches. To have an efficient organization he must spend most of his time with his men. He must be very careful that discipline does not become lax. He must also be thoroughly familiar with the office work, but we will not take that up in these lectures.

The company commander is responsible for the vehicles and all the equipment, tools, etc. He must impress upon the men that they also are responsible to him and with him. It is his duty to choose competent noncommissioned officers to assist him in his work. He must see that all the rules and regulations of the Army and of the Motor Transport Corps are observed. He must see that any man who violates the rules of the Army and of this Corps is disciplined or punished according to military procedure. When the company is in convoy the commanding officer must see that the orders, rules and regulations of the M.T.C. are rigidly obeyed.

Before a convoy starts the commanding officer will see that the supply of gasoline is adequate for the trucks, that rations and clothing for the men are sufficient, and that cargo is properly loaded. While the men are getting ready to leave he should spend his time inspecting the company, observing each truck and man, and seeing that everything needed is loaded; taking into consideration the length of time that they will be away, or when they will be able to get more supplies. He will also provide himself with the necessary maps, passes and orders. The truckmaster will assist the company commander in making his inspection. They will together inspect the loaded supplies and equipment.

The commanding officer can, if he wishes, have the assistant truckmaster hold the informal inspection, but this is not desirable and should only be done when some exigency precludes the commanding officer and truckmaster doing it. When the assistant truckmasters hold the informal inspection the assistant mechanic will report to the truckmaster, and the truckmaster to the company commander.

When the company is halted the company commander will see that the drivers and assistant drivers do whatever is necessary to prepare the vehicles for an immediate start. He should then go over his company, making an informal inspection. He should also see that his noncommissioned officers are on the job, looking over the trucks, and instructing the drivers to grease, etc. Every second of time should be spent on the machines. It is the duty of the commanding officer to see that before the men are given rest, the convoy is prepared and ready to start at the command.

At times the company commander will find it unnecessary to accompany the convoy, or in some cases the company will be split up, half of the organization going one place, and the other a different direction. In such cases it is for him to decide which convoy is the more important and accompany it. He should then send the truckmaster with the other section, or if it is only one or two trucks, one of the assistant truckmasters may be placed in command. If the company is so divided that the number of assistant truckmasters is not sufficient, the commanding officer will then appoint his best drivers as acting assistant truckmasters for each group assigned to duty.

Under the above conditions only should the company commander send the company out under the truckmaster or assistants, as his place is in active command, and he should be with the company at all times. Usually his place is in the rear of the company, but from time to time he should pass the vehicles in convoy to assure himself of their efficient operation. The commander should be on the watch for all vehicles compelled to fall out, and give the necessary instructions. He should remain no longer than is necessary to give instructions to the driver of a vehicle that has fallen out. He should then go on with his company. Of course, when going over unfamiliar roads, it is his duty to precede the convoy. Before leaving the convoy he will tell the truckmaster what to do in his absence, how long he will be away, etc. If the company commander has reasons to believe that he will be away from the company for a considerable length of time he should tell the truckmaster where to halt the company until his return, or where he will meet the company.

The company commander should, before entering a large town or city, pass through it in advance of his company, obtaining all information regarding road conditions, traffic rules, etc., first telling the truckmaster where to halt the company, awaiting his return. Of course, in convoy, there will be other times when it may be necessary for him to leave, but he should leave only when it is absolutely necessary.

When the company commander is in the rear of the train, the truckmaster is the guide; he rides in the first truck of the first section unless the company commander places him at some other station.

All railroad crossings must be examined before the arrival of the company, and if necessary a man, usually the assistant driver of the first truck in the first section, stationed there to pass on orders. The commander should state how many trucks should pass over a bridge at one time, usually one truck to a span. The man posted at a railroad crossing or a bridge tells each driver as he passes the orders of the commanding officer. The man stationed as a guide is picked up by the last truck in the company or train. When the convoy is halted, he resumes his original position. It is not good policy to split a company; but should it happen, it is best to split the company at one of the sections. There have been instances where the men who were stationed as guides, jumped on the commanding officer's car. This should not be permitted. The man should ride only when invited by the commanding officer to do so.

The commanding officer is responsible for his equipment. Therefore he should not permit the vehicles under his command to go on ground that may injure them, such as soft ground, etc. If the commanding officer should, through an accident or error, put his company in such condition as to cripple it badly, he should try his utmost to get it in shape without communicating with his superior officer.

In crossing bridges caution should be observed. In France, for example, each bridge bears a sign giving its capacity (the maximum weight it will stand). Very little leeway is given, and strict attention must be paid these

signs. It is the duty of the commanding officer to see that all the men in the organization learn the different road signs, and are able to understand them.

If the enemy is shelling a bridge, the crossing should be effected immediately after a shell has alighted, as bombardment is generally methodical, and there is an interval between shells.

When the company is traveling independently, and it becomes necessary to pitch a new camp, it is the duty of the commanding officer to be there, as there are many things to do that require his attention. The first thing he must do before making camp is to go well in advance of his company and consult with the military authorities. He should make sure that the camping ground is suitable for the men, that it is not a damp or wet place, and that space can be had nearby in which to park the vehicles.

In the territory of the service of supplies, towns and villages are generally under civil control. At the front they are under military control. In each town or village the mayor, or major, should be consulted before the camp is established, as he may be of considerable assistance. In parking the vehicles on a dead street or on soft ground, always keep the vehicles together, and if possible under the cover of trees for protection against enemy airplanes.

These are only a few of the duties of the officer in charge of a convoy company; he must be ever on the alert.

The duties in the field of the second in command are much the same as those of the commander; to act in his absence, to assist him in all his duties, and to perform such tasks as are assigned to him by the commanding officer. At times it is necessary for the second in command to take over in whole or in part the responsibilities of the commanding officer. He must be prepared to do so at any time.

The truckmaster holds a very important position. He is the first sergeant, and therefore is the immediate executive. He dispatches all truck convoys, attends to all calls, such as fatigue details, roll calls, etc. He transmits all orders and directions of the commanding officer, and is directly responsible to him.

The chief mechanic is a sergeant and the assistant mechanics are corporals. The chief mechanic is responsible for the mechanical condition of the vehicles of the company at all times. It is his duty to see that the assistant mechanics do their work and that they are efficient. He should also oversee all important work. He receipts for the equipment of the repair truck, tools, spare parts, etc.

The assistant mechanics are generally assigned to sections, but they at all times work under the direction of the chief mechanic.

The assistant truckmaster is the chief of his section. He is to his section what the truckmaster is to the company. He should at all times maintain discipline. He is the intermediary between his men and the truckmaster. If a man wants to speak to the commanding officer he must first get permission from the assistant truckmaster, and then the truckmaster, who will try to straighten the matter out. If it is necessary, the truckmaster will give the driver permission to speak to the commander.

All orders for the drivers should go through the assistant truckmaster. It is also his duty to see that the men are properly clothed. If the men are not properly clothed he should report the fact to the truckmaster. He should at all times work with the assistant mechanic on informal inspection, making sure that his section is always in good condition and ready to move at any time. The assistant truckmaster has an important position, as he comes in

direct contact with all the men of his section. He also makes all orders for repairs, and sees that they are carried out.

Each driver is assigned to a truck with a complete set of tools, etc., and all necessary equipment, which he must keep clean and in good repair. This equipment is subject to inspection at any time; it is the driver's duty to see that everything which he is responsible or accountable for is ready for inspection by superiors at any time. He should spend his time on the vehicle, keeping it in first class condition, making all minor repairs and adjustments.

The assistant driver works under the driver, the driver assigning his duties, that is, the work he is to do: cleaning for inspection, greasing, etc.

The driver will not permit overloading, as ordinarily he is responsible for the safe delivery of the cargo.

He must be familiar with the instructions issued for operation and maintenance of the particular vehicle assigned to him. He keeps the log book accompanying the vehicle, which is the service record of same. He also keeps account of all gas, oil, etc., used for his vehicle; makes out accident reports, etc. Both he and the assistant driver must know the road rules. Now if you have listened and understood what has been said, you must surely know that to make your company an efficient M. T. C. unit you must be everlastingly on the job.

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TYPICAL QUIZ QUESTIONS (FOLLOWING LECTURE IV)

Typical Quiz and Examination Questions on preceding lectures of the course:

1. What is meant by S.O.S?
 - (a) Of what is it a division?
 - (b) Into what 3 sections is it in turn divided?
2. Is the Motor Transport Corps answerable for the good condition of troops and supplies that it transports?
3. In what way can the training of units of infantry be compared to the training in the Motor Transport Corps? Explain with aid of diagram.
4. Give any five road rules. Why is the 10th road rule of vital importance in time of war?
5. What is your idea of *Routes Gardees*?
 - (a) In what zone are they found?
 - (b) In what relative direction to the front line trenches may they run?
6. We say the truckmaster must be a man of force. Just what do you understand by this?
7. How many men are there in a Motor Truck Company? What ranks and how many of each rank?
8. How many of the personnel in a Motor Truck Company carry side-arms only?
9. What is the rank of the company clerk and what are some of his duties?
10. What is the difference between the arm signals for *Reverse Convoy* and *Assemble*?
11. Give all distances between trucks and between sections in open and closed formation driving.
12. Give the speed limits for trucks, in towns and villages and open country roads.
13. How may you and your organization be "hustlers" and yet seldom, if ever, break the speed limit?
14. Which goes more into detail, a civil or a military map?
15. What are contours and what do they immediately convey to the mind when seen on a map?
16. How would an overhanging cliff be shown?
17. How many feet are there in one meter?
18. How many feet in a kilometer?
19. Are men required to give receipts for their convoys in the advance zone?

20. Name two things you will try to do if, during convoy, you are attacked by airplanes.
21. Why is the loading of troops handled under such a thorough system?
22. What is the French word used to denote gas attack, and what must you do when you see that sign?
23. What kind of formation always is the order when crossing a bridge of any length?
24. On which side of a pontoon bridge must the driver keep his truck?
25. What is the assistant driver required to do when the truck is backing on a corduroy road?

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
FIELD WORK

LECTURE V

LOADING AND UNLOADING RULES FOR TROOPS

Troop loading is an important matter. To explain it graphically many drawings and diagrams must be used.

Troop loading must be carried out in a military manner. The commanding officer must proceed to loading or unloading points well in advance to complete all arrangements and to reconnoiter the ground. Before leaving his company he should instruct the second in command or the truckmaster where to stop or to give whatever orders may be necessary. If the commander cannot precede the convoy, he should assign this duty to the second in command.

The convoy should halt at the designated loading point faced towards the destination. At the command: 1. *Attention*, the assistant drivers jump out to their places by the front hub. 2. *Prepare to load troops*. At this command, each driver goes to the back of the truck, drops the tail gate and arranges the seat. Then the command *MARCH* is given and the assistant drivers march forward to the first truck of their respective sections and take their places in the column of assistant drivers.

When the truckmaster has assured himself that the men in all the sections are ready, he commands: 1. *First section, column left*, 2. *MARCH*. When the column reaches the opposite side of the road, the truckmaster commands: 1. *Column left*, 2. *MARCH*, and the men march down the right side of the road toward the rear of the convoy. As section one passes by section two the assistant truckmaster repeats the truckmaster's command and the column falls in at the rear of the first section. Section three executes the same movements. When the assistant drivers in column reach the end of the company, the truckmaster commands: 1. *Assistant truckmasters, by the right flank*, 2. *MARCH*. The assistant truckmasters dart through the column, the column of assistant drivers halts about two paces from the troops if they are ready to be loaded. If the assistant drivers reach the position before troops arrive, the troops should be halted at a distance of two paces.

The company commander should designate the point where the assistant drivers shall stop. When the column is halted the truckmaster gives the command: 1. *Left face*, 2. *Right dress*, 3. *FRONT*. Each succeeding assistant truckmaster halts his section and repeats the commands. When all sections are present, the truckmaster reports to the company commander and the company commander notifies the troop commander that he is ready to load troops.

It is the company commander's duty to see that the men carry out these regulations and that the assistant truckmaster and the truckmaster report their sections and companies properly. In this case, as in all others, every report from the assistants must go through the truckmaster.

As the column of troops reaches the truckmaster, at the right of his line of assistant drivers, the first assistant driver steps out in front of the marching

troops. The truckmaster stands beside the column of troops and as they pass by slowly he counts off 20 men. When he has counted the 20, he drops his arm to separate them from the column. The assistant driver commands *Follow me*, and steps off at a quicker pace to leave space for the next 20 men. The assistant driver is then in command of the 20 men and is held responsible for them. When they reach the truck, the driver helps the assistant driver load the troops.

All the troops' equipment, such as barracks bags, bed sacks, mess kits, etc., must be placed beneath the seats. Rifles of course are kept with the soldiers.

One thing must be remembered is that men are not to get in over the side of the vehicle, but must be loaded in over the tail gate. After the men are in the truck, the assistant driver securely fastens the tail gate. Then both he and the driver resume their positions on the seat and await orders from the assistant truckmaster. When all drivers and assistant drivers have returned to their seats, the assistant truckmaster reports to the truckmaster, saying: *section one (two or three)* is loaded and ready to move. The truckmaster awaits orders from the company commander.

Every care should be exercised by the company commander in the loading of troops, as it is one of the hardest transport jobs. The commanding officer should be at the point where the troops are being counted off to keep the column moving. If he is not there the men will lose their places and become scattered about the road. It would take too much time to load them in this manner.

When troops are to be unloaded at a town, instead of unloading in the town, the convoy should go through the town and unload on the opposite side. If the troops got out in the center of the town there would be a crowd of tired troops standing or sitting around and some one might get hurt.

At times troops must be loaded where the traffic is quite thick. In this case load on some side street if possible. When necessary, the street can be guarded by the military police, shutting off all traffic.

At times the company may be in a train, and may be kept waiting. In this case the commanding officer should let his men get out and work on their trucks. The company commander can never say too much about oiling and greasing the vehicles.

In hauling troops the commanding officer should not depend on the driver to make the men comfortable. He should inspect his company after it is loaded. If the tarpaulin is being used, he should make sure that there is plenty of air circulation.

The company commander should order the truckmaster to instruct the troops that there will be no smoking permitted on or within ten feet of the truck. The drivers are held responsible for this order being enforced.

Refer to Part VII of the Tentative Training Manual of the Motor Transport Corps in which a diagram will be found headed "Company Formation for Loading Troops."

MOTOR TRANSPORT CORPS

EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course

FIELD WORK

LECTURE VI

MAP READING

A military map is a drawing or plot on which roads, woods, streams, hills, marshes, and other objects of military importance are shown in their relative positions by means of conventional signs.

Military maps differ from ordinary civil maps in many ways. They give the relative distances, elevations, depressions and directions of all objects of military importance. While an ordinary map might merely indicate a road, a military map would show whether the road is fenced or not, as well as its width, construction, and condition.

The civil map shows only the large rivers, national highways, etc., while the military map shows the width and depth of rivers. Civil maps are used at times as they can be used as a basis for the construction of military topographical maps. Civil maps when available should be carried on long convoys.

Military map reading requires a great deal of time, study, and practice. Before a military map can be of use to a man on convoy he must be able to look at it and visualize the actual country represented. He must at first figure the distance to be traveled, then be able to see every hill, turn, etc. He must also be able to locate woods, etc. For instance, if he knew that within a certain distance he would be under shell fire, he must be able to look at the map and determine quickly just where a woods may be found, the distance to it, and the time it will take to get there. Practice is most important in acquiring ability to read maps.

The most essential points in map reading are:

First: To be familiar with the various signs and symbols used to designate the different objects.

Second: To understand that each distance on the map is a fixed part of the corresponding distance on the ground. For example, two places are an inch apart on the map and a mile apart on the ground, an inch measured anywhere else on the map would also be a mile.

Third: To realize that the directions of objects on the map correspond to their actual directions from each other on the ground.

Fourth: To remember that contours and hachures must convey a clear mental picture of the ground actually represented, a contour being a line on the map which shows the route traveled on the ground in order to travel on an absolute level. For instance, if you went half way up the side of a hill, and starting there walked around the hill neither going higher up nor lower down and then made a sketch of the route you followed, the line representing your path around the hill would be, in effect, a contour. By means of these contour lines at different vertical elevations, the valleys, hills, etc., can be shown graphically on the military map.



The contours of a cone are circles of different sizes, one within another, and at the same distance apart, because the slope of a cone is at all points the same.

The contours of half a sphere are a series of circles, far apart near the center and near together at the outside, showing that the slope of a hemisphere varies at all points, being nearly flat at the top and increasing in steepness toward the bottom.

The contours of a concave cone are close together at the center and far apart at the outside.

The following additional points about contours should be remembered:

- a. A water shed or spur, along which rain water divides and flows away on both sides, is indicated by the higher contours bulging out toward the lower ones.
- b. A water course, or valley, along which rain falling on both sides joins in one stream, is indicated by the lower contours bulging in toward the higher ones.
- c. The contours of different heights which unite and become a single line, represent a vertical cliff.
- d. Two contours which cross each other represent an overhanging cliff.
- e. A closed contour without another contour in it, represents either an elevation or a depression, depending on whether its reference number is greater or smaller than that of the next contour.

If the student will first examine the drainage system, as shown by the courses of the streams on the map, he can readily locate all of the valleys. Knowing the valleys, the hills and ridges can then easily be placed, even without reference to the numbers on the contours.

A second method of representing on the map elevations on the ground, is by means of short vertical lines called hachures. Where no hachures are found on a hachured map, the ground is either a hilltop or a flat lowland, and the slopes are roughly indicated by the varying blackness and nearness of the hachures. The darker the section, the steeper the slope.

COVE, OR ACCIDENTS OF THE SURFACE

This includes all elevations or depressions upon the surface of the ground, whether natural or artificial, which might be an aid or hindrance to military operations. These are indicated by certain conventional signs.

Note to Instructor: It will be necessary to cut cardboard circles to different sizes, placing them on a wire, to explain this lecture correctly.

The map on the preceding page was made from local maps of the Jacksonville, Florida, region, adopting the methods used in the French "Etats-Major" maps and changing the topography to a certain extent to make the area represent the Soissons region in France. Similar maps may be constructed from local maps of any region, so that the interest of the student may be increased in the use of such maps.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
FIELD WORK

LECTURE VII

MAP READING

In today's talk we will take up the subject of French maps. On one of the following pages will be found the symbols of the *Etats Major* map, which should be studied in order to get the full benefit of the map. All information which is needed on a military map may be grouped under the following heads:

1. Direction.
2. Distance.
3. Contour or shape of the ground.
4. Cove or accidents of the surface.

Direction is indicated on the map by the established symbols. The general rule of map reading and map making is that the top of the map is always north unless otherwise indicated. The map maker ordinarily places on his map an arrow or a needle, the head of which points toward the north. N., or north, as usually indicated, means the true north as distinguished from the magnetic north. When the compass is used, its needle points not to the true north, but to the magnetic north. The variation of the magnetic needle from the true north is frequently indicated by a second arrow, or the true north line is expressed in degrees, or fractions, minutes and seconds, of degrees.

For map reading purposes, the difference between the two directions, as well as the reason for it and the method of its determination may be disregarded. Or, if the compass is used, the magnetic north may be taken, and the true north disregarded.

ORIENTATION OF A MAP

As ordinarily used, orientation means the placing of a map so that directions on the map are parallel to the corresponding directions on the ground.

DISTANCE

Distance on the map is expressed on the map by the scale of the map. That is, the scale of the map is the expression of the relation between distance on the ground and the corresponding distance on the map.

METHODS OF REPRESENTING SCALES

There are three ways in which the scale of the map may be represented:

- 1st. By an expression in words and figures, as: 1 inch equals 1 mile.
- 2nd. By what is called the natural scale, or the Representative Fraction, (R.F.), which is the fraction whose numerator represents units of distance on the map and whose denominator represents units of horizontal distance on

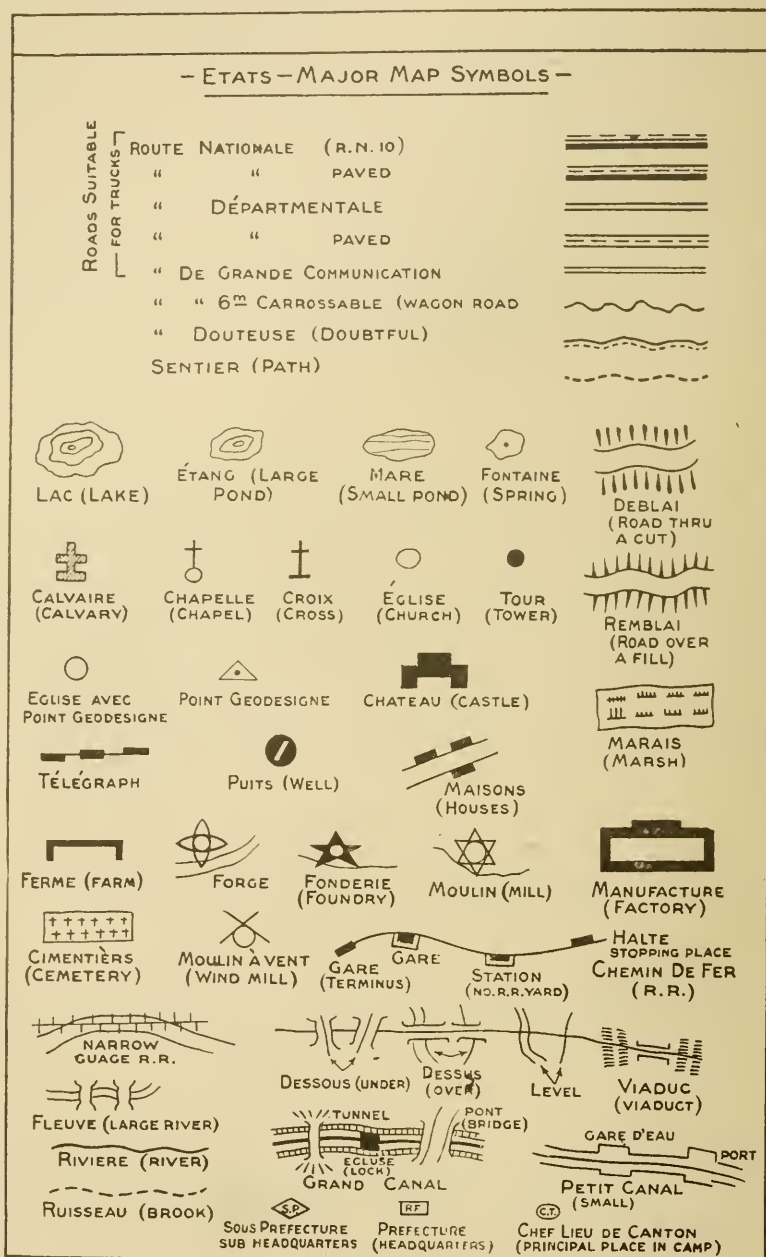
the ground, being written thus: $R.F. = \frac{1}{63360}$ or 1:63360, or 1 is 63360;

all of which are equivalent expressions and are to be understood thus: That the numerator is the distance on the map and the denominator is the horizontal distance on the ground.

3rd. By what is called the graphical scale. This scale is a line drawn on the map, divided into equal parts, each division being marked, not with its actual length, but with the distance it represents on the ground.

It can readily be seen that a map's scale must be known in order to have a correct idea of the distance between objects represented on the map. This is essential in determining length of march, ranges of small arms and artillery, relative lengths of marches by different roads, etc. Therefore, if under service conditions you should have a map without a scale, or one expressed in unfamiliar units, you would first of all be compelled to construct a scale to read yards, miles or some other familiar unit.

Note.—Instructor should draw symbols on the black board and explain same to students in detail.



MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
FIELD LECTURES

LECTURE VIII

LOADING AND UNLOADING MATERIAL

When trucks are being loaded preparatory to convoy, the cargo should be properly distributed and adjusted, each article placed so that it will travel undamaged and at the same time not take up more space than necessary. Trucks in the M.T.C. will be called upon at some time or other to carry mixed cargoes, representing nearly everything that is supplied to the army. To give the student an idea of what may be encountered in loading we may mention one load which contained bridge supports, coal, troops, fresh fruit, oil in barrels, ammunition, office furniture, clothing and ordnance. In an emergency mules may be carried. It is evident that as in all other branches of the service, judgment must be used in distributing such things. A barrel of oil should not crush a crate of fruit, or be placed near a bundle of clothing that might be soiled by it, nor should ordnance and furniture be carried together. This is speaking generally, however, as in emergencies a great many things will be carried regardless of classification, the main object being to get things moved.

It is forbidden to drive nails, staples, lag screws, or any similar thing in the wooden carriage or box of a truck. Plenty of rope is provided for lashing articles securely to prevent side sway and rebound, but the main thing is the foresight and ingenuity of those who load or supervise the loading at the supply depots and dumps.

Cargoes should be well covered from direct sun or rain. The wastage of war is terrific and every care must be taken in handling supplies to minimize it. If a certain article or group of articles is destined to be unloaded en route, place these things in a separate truck that may drop out of the convoy, unload and then join the convoy later. If there is not sufficient of these incidentals to make up a load, place them as accessible a part of the main load as possible so that when the destination of that article is reached, time will not be wasted by tearing the whole load to pieces to locate it.

Overloading a truck is bad and is forbidden. During the present emergency the shortage of trucks has necessitated the breaking of this rule, but clearly understand it has never been done, and must never be done, without order from proper authority.

The following list of engineers' supplies and ammunition gives some idea of the materials to be carried. A table of weights is also supplied to give the student an idea of the relative weight of various articles and the quantity that may be, with safety, loaded into a truck:

MISCELLANEOUS

QUANTITIES WHICH CAN BE LOADED INTO MOTOR TRUCKS

ARTICLES	How Packed	Loaded and Lashed		
		1 ½ T.	3 T.	5 T.
Gas Tanks.....	50 gal. full.....	500 gal. 10	900 gal. 18	1350 gal. 27
	50 gal. empty.....	18	27	27
	13 gal. full.....	390 gal. 30	780 gal. 60	1300 gal. 100
	13 gal. empty.....	84	125	125
Tires Penumatic.....	Assorted Sizes.....	75	150	150
Mail Bags.....		30	50	60
Tarpaulins.....		25	50	70
Barrack Bags.....		25	50	70
Trunks, Army.....		30	60	60
Men.....	Baggage.....	12	20	25
Men.....	Without Baggage.....	18	35	35

ENGINEER STORES

QUANTITIES WHICH CAN BE LOADED INTO MOTOR TRUCKS

	1 ½ Ton Truck	3 Ton Truck	5 Ton Truck
Barracks, "Adrian" (21'x98').....		1/3	1/3
Bricks.....	750	1500	2500
Camouflage, finished, rolls of 20 sq. kds.....	80	100	120
Cracked stone, cubic yds.....	1 ½	3	5
Cement, bbls. 4-100 lb. bags).....	12	24	30
Corrugated iron, sheets, sq. ft.....	1200	3000	3000
Duck boards, (6'6"x1'6").....	100	150	150
Expanded metal, large mesh, sq. ft.....	1600	2500	2500
I-Beams, 4"-12'0" long, pce.....	40	80	110
I-Beams, 6"-16'0" long, pce.....	20	40	65
Lumber, Ft. B. M.....	1200	2500	3500
Nails, all sizes, 100 lb. kegs.....	30	60	80
Paint, 50-gal. bbls.....	4	9	14
Pickets, wood, 50% long and 50% short.....	350	500	500
Posts, angle iron (50% 5' 10" long).....	500	1000	1700
Posts, angle iron (50% 3' 6" long).....	500	1000	1700
Posts, screw, 50% long and 50% short.....	700	1400	2400
Rails, 10'0" to 12'0" long, 25 lb. per yd.....	40	80	110
Rails, 15'0" long 35 lb. per yard.....	20	40	70
Revetting, fascines, 10"x9'0".....	30	35	35
Revetting, gabions, 2'0"x3'2".....	25	32	32
Revetting, hurdles, 7'3"x3'2".....	50	75	75
Road planks, 5"x9"x9'0".....	42	70	70
Roofing felt (216 sq. ft., rolls).....	80	130	130
Sand bags, number.....	10000	15000	15000
Shelters steel, large, complete.....	1	2	2
Shelters, steel, small, complete.....	2	2	2
Round posts, 6" rough lineal feet.....	650	1000	1000
Tar, waterproofing, 50 gal. bbls.....	10	20	24
Ties, for narrow gauge, 4'6"x6"x4".....	46	92	152
Tele. conduit cable spools.....	1	2	3
Wire, barbed, 50 lb. rolls.....	40	50	50

ORDNANCE (AMMUNITION)

Size	Article	MAXIMUM LOAD FOR ONE TRUCK				Remarks
		1½ T. M. T. C. 10'x3'4"x2'	3 T. M. T. C. 12'x6'6"x2'	5 T. M. T. C. 12'x6'6"x2'	3 T. Ord. 9'6"x3'7"x3'	
37 m/m	Complete Cart.	1800 (30 cases)	4020 (67 cases)	5700 (96 cases)	3920 (57 cases)	Cases on bottom
	Fuse					
	Complete Cart.	135 (15 cases)	261 (29 cases)	432 (48 cases)	261 (29 cases)	Cases on bottom
	Fuse					
75 m/m	Complete Cart.	50 (25 cases)	102 (51 cases)	170 (85 cases)	102 (51 cases)	Cases on bottom
	Fuse					
	Shell	52 loose or 12 cases	104 loose or 24 cases	172 loose or 40 cases	104 loose or 24 cases	Shell on end. Cases flat
	Fuse					
4.7 Gun	Charge	166 (wt full)	333 (wt full)	400 (space full)	133 (space full)	Cartg. on end
	Primer					
	Shell	32 loose or 13 cases	63 loose or 27 cases	115 loose or 45 cases	63 loose or 27 cases	Shell on end. Cases flat
	Fuse					
155 m/m	Charge	150 cases (wt full)	250 cases	230 cases (space full)	96 cases (space full)	Cartg. on end
	Primer					
	Shell	33 loose or 11 cases	66 loose or 22 cases	110 loose or 37 cases	66 loose or 22 cases	Shell on end Cases flat
	Fuse					
6" S. C. Gun	Charge	75 cases (wt full)	150 cases (wt full)	187 cases (space full)	102 cases (space full)	Cases on end
	Primer					
	Shell	15 loose or 13 cases	30 loose or 27 cases	50 loose or 44 cases	30 loose or 26 cases	Shell on end Cases flat
	Fuse					
8" S. C. Gun	Charge	20 cases (wt)	48 cases (wt)	54 cases (space)	27 cases (space)	Containers on end
	Primer					
	Shell	15 loose or 13 cases	30 loose or 27 cases	50 loose or 44 cases	30 loose or 26 cases	Shell on end Cases flat
	Fuse					
8" How	Charge	26 cases (wt)	48 cases (wt)	54 cases (space)	27 cases (space)	Containers on end
	Primer					
	Shell	15 loose or 13 cases	30 loose or 27 cases	50 loose or 44 cases	30 loose or 26 cases	Shell on end Cases flat
	Fuse					
8" S. C. Gun	Charge	26 cases (wt)	48 cases (wt)	54 cases (space)	27 cases (space)	Containers on end
	Primer					
	Shell	15 loose or 13 cases	30 loose or 27 cases	50 loose or 44 cases	30 loose or 26 cases	Shell on end Cases flat
	Fuse					
8" S. C. Gun	Charge	26 cases (wt)	48 cases (wt)	54 cases (space)	27 cases (space)	Containers on end
	Primer					
	Shell	15 loose or 13 cases	30 loose or 27 cases	50 loose or 44 cases	30 loose or 26 cases	Shell on end Cases flat
	Fuse					
8" S. C. Gun	Charge	26 cases (wt)	48 cases (wt)	54 cases (space)	27 cases (space)	Containers on end
	Primer					
	Shell	15 loose or 13 cases	30 loose or 27 cases	50 loose or 44 cases	30 loose or 26 cases	Shell on end Cases flat
	Fuse					
8" S. C. Gun	Charge	26 cases (wt)	48 cases (wt)	54 cases (space)	27 cases (space)	Containers on end
	Primer					
	Shell	15 loose or 13 cases	30 loose or 27 cases	50 loose or 44 cases	30 loose or 26 cases	Shell on end Cases flat
	Fuse					

The following instructions with reference to the handling of ammunition must be carried out to the letter:

1. In handling all types of ammunition, care must be taken that crates are not broken; or, if uncrated that the copper bands at base of shell are not scratched. Damaged bands render the shells not only useless but dangerous to fire.

2. Do not allow colors painted on shells to be effaced; they were put there for a purpose and are necessary.

3. Protect ammunition from sun and rain; both are harmful to the high explosive filling.

4. When fuses are attached to shells, do not handle by fuses. You may destroy the protective cover and ruin the fuse. Where fuses are not attached, plugs replace them; should one of these fall out, put it back at once.

5. When handling gas shells, be provided with masks to protect against leaky shells.

6. All ammunition is highly explosive, therefore dangerous. Do not smoke while moving it and **HANDLE IT WITH CARE.**

MOTOR TRANSPORT CORPS

EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course

FIELD WORK

LECTURE IX

CONVOY PROBLEMS

When an order is given to an officer to proceed to some specific place with a convoy, he may or may not be familiar with the route, but he must be able to take a map of the country through which he is to pass and as far as possible from that map figure his trip as to the number of miles. If his trip is not a direct trip, he must have foresight enough to make all stops required and not double on his tracks, thereby wasting tires, gasoline, labor and lastly what is most important of all, time. This procedure resembles the problem sometimes given by railroad companies in their schools. In that case a switchman working in a congested freight yard must spot cars on different spur lines or sidings with the least "doubling" of the switch engine.

Being familiar with French maps and their different signs you will learn from them precisely what sort of roads, streams, fords, you will encounter; will give you in fact, a very accurate description of the territory over which you will pass.

The study of military maps has been taken up in previous lectures in the course, and it is assumed that the student has familiarized himself with this in detail. The following problem is submitted as an example, and in the future other problems will be given as exercises.

CONVOY PROBLEM

The following problem with remarks on its solution is given as a practical example of conditions to be found and situations to be met in the transport service at the front:

The Commander of the Motor Transport Company at M (see sketch on p. 4), attached to the th Army Corps, and operating three-ton trucks, is given the transport order shown of form M. T. S. 116 attached, at 10 P. M., May 15th.

SOLUTION OF PROBLEM

Upon receiving this order the company commander must first consider just what the present status of his company is, i. e., how much gasoline and oil he has; how many of his trucks are under repair; the status of his personnel, and his supply of rations. He must then study his map with a view to prescribing the itinerary to be followed and calculating distances between points,

AMERICAN EXPEDITIONARY FORCES

MOTOR TRANSPORT SERVICE

MOTOR TRANSPORT ORDER

Order No. 53. Date, May 15, 1918.

Date of Execution of Order, May 16, 1918.

FROM Capt. James Smith.....TO.....1st Lieut. G. Brown.....
(Officer issuing order) (Officer who will execute order)

14th Supply Train.

You will Furnish Motor Transportation as Follows:

Number of Vehicles	REPORT FOR LOADING			Tons	REPORT FOR UNLOADING			Route and Remarks
	To (Place)	At (Time)	To Officer		To (Place)	At (Time)	To Officer	
26	A	1 P. M.	Major Blank	500 men and baggage	Y and Z See remarks	6 A. M. May 17		Route to load M-A. Route to unload A-Y, except that vehicles for Z will use X-Z to unloading point. All vehicles via Y-Z-C to new permanent camp at C, which will be established under Capt. Doe, 15th Supply Train. Gasoline and oil can be obtained at N. Major Blank at A will advise destination of troops for Y and Z.

Total No. of Vehicles 26
Order Received at (Place) M.....Signed Jas. Smith (Signed)
(Time) 10 P. M.....(By officer issuing order)
(Date) May 15, 1918.....
(Signed) G. Brown.....Rank.....Capt., Q.M.R.C.....
Rank.....1st Lieut. Q.M.C., N.A.

A.—This form is filled out by an officer or other person who directs the movement of companies, sections or individual trucks. The order is made out in single copy, and when delivered to the officer, or other person who is to carry out the order, it is required that the officer or other person who receives said order, shall enter place, time and date of receipt of the order, and sign said statement. The order will then be given to the officer or other person who is to carry out the order. After the order has been carried out, and the data entered, as to truck numbers, tonnage, etc., it will be signed by the officer or enlisted man who has carried out the order, and returned to the officer or other person who issued same.

B.—The space below is to be filled out by commanders of companies, sections, and by individual truck drivers after they have carried out this order.

Individual Truck Nos.	Individual Truck Tonnage	Estimated Loaded	Mileage Empty	Hour of Return	Individual Truck Nos.	Individual Truck Tonnage	Estimated Loaded	Mileage Empty	Hour of Return
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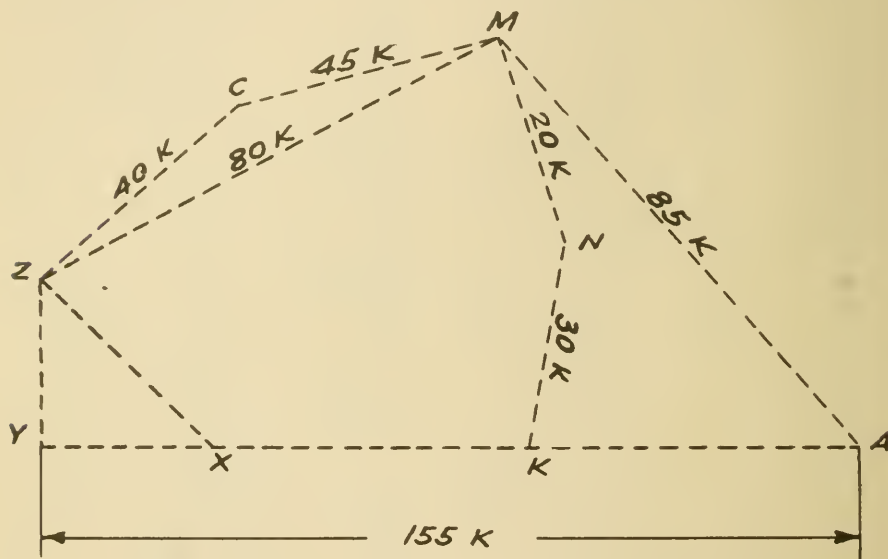
C.—State below any changes that were made in this order with regard to cargo, loading or unloading places, route or time and by whose authority.

D.—Give below a report of general conditions during the day making special mention of any accidents, delays, vehicles repaired on the road, conditions of road, conditions at loading and unloading places, and any suggestions that will make for the betterment of the service.

G. Brown (Signed)
Signed.....1st Lieut., Q.M.C., N.A.
Rank.....
(Officer or enlisted man who carries out order.)

so as to be able to determine his hours of departure, his speed, and such other matters as are outlined below. He must then calculate the distance he can go on the amount of gasoline and oil he has on hand and where he must replenish his supply.

The company commander must then issue definite and written orders to his noncommissioned officers, prescribing that the convoy shall leave at 6 A.M. (this being the hour of departure he determines upon as necessary in order to arrive at the loading point on time) and showing the itinerary to be followed and the times and places of loading and unloading, and must direct that the men take all their personal equipment. Supposing that one of his cargo trucks is in the repair shop, he will calculate that, at a rate of 20 men per truck, he will have but one empty truck. He will direct that this truck be placed in the rear of the convoy just in front of the file closer's truck.



Supposing that the amount of gasoline and oil in the cargo trucks and in one of the two tank trucks will safely carry the convoy to the point "K" v'a "A," but not to the unloading points, he will direct that at 8 A.M. the other tank truck shall proceed to "N," fill up, and join the convoy at the point "K," where the convoy will be halted to replenish with gasoline and oil, to rest the men, and to provide the men with their supper on the evening of May 16. Eight A.M. is set as a convenient hour of departure for the tank truck, which will allow the men time to assist in breaking camp, and to arrive at point "K" on time.

The company commander will direct the cooks to prepare breakfast for all the men at 5 A.M., May 16, to furnish all men with the necessary rations for one meal to be taken by them in their trucks, and to attach the kitchen trail-mobile, with all equipment, to the gasoline supply truck going at 8 A.M. to "N." The cooks will furthermore be instructed to furnish the men with a hot meal at the point "K," with hot coffee after final unloading just beyond "Z" and with breakfast on the morning of May 17th.

The company commander will direct his lieutenants to remain behind with the motorcycle side-car, a responsible noncommissioned officer and sufficient personnel to break camp. As soon as possible after the departure of the gasoline supply truck and the kitchen trailmobile at 8 A.M., the lieutenant will proceed with all remaining camp equipment (loaded in company supply truck) to the town of "C" where he will make all necessary arrangements with the commander of the 15th Supply Train for the establishment of a permanent camp. The driver and assistant driver of the disabled truck will be directed to proceed to "C" as soon as their truck is repaired.

On the road the company commander will act as prescribed in the manual under "Road Rules and Convoy Discipline."

The commander will be at the loading and unloading points well in advance of his convoy, in order to make all necessary arrangements and will designate a point just above Z on the road to C, where the first section of his convoy, which unloads at Z, will wait for the second section, which unloads at Y, and hot coffee will be served. On the route M to Z, the convoy will be run as a single unit.

En route, the commander will pay particular attention to maintaining the unity and the necessary speed of his convoy, and to the comfort of his men.

On his arrival at the new camp at C, he must immediately pay particular attention to two important duties; 1st, to put his company in readiness to take the road again immediately; 2nd, to rest his men.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
FIELD WORK

LECTURE X

PARKING RULES

When it becomes necessary to pitch camp while on extended convoy trips, care should be taken that the site is a suitable one. The commander should at first make sure that the parking ground is as near to the camp as possible. He should *never* park the vehicles on a dead street or soft ground. He should keep vehicles together and easily accessible, if possible under cover. Trees are good protection against enemy airplanes. He should never park the vehicles near a bridge.

Bridle paths along rivers and canals afford good parking facilities. If hard ground can not be found for parking, crushed rock or a substitute must be used to give foundation and traction for the wheels, which are parked to suit—in column of section, line of sections, company front, etc., as will be explained later in the lecture.

Do not split convoy company when parking. In towns and cities companies in convoy may have to be parked at the curb.

The commander must establish a guard.

Now we will take up the formation of a motor company, in company front or line formation. It is as follows: The first truck of the first section is the right guide, through the staff car and motorcycle, when in position, are at the right of it. Frequently the company will be in line formation when the staff car and motorcycle are on duty. Hence the first truck is always used as right guide. The repair truck is the left guide. Trucks are placed in order of number of sections and sections are placed consecutively, the first section at the extreme right, the second section in the center and the third section at the extreme left. The supply tank and the repair truck are aligned with the third section of the left, in the order named.

The distance between trucks is two yards, the distance between sections is four yards. When in position the motorcycle is two yards to the right and abreast of the first truck of the first section and the staff car is two yards to the right of the motorcycle, with the front wheel hubs abreast. Alignment is taken from the lining posts or when lining posts are not used, from the front wheel hubs of the trucks. Front wheel hubs of all vehicles are abreast in correct alignment when in permanent parks. Frequently in temporary parks lining posts are used. One is at the extreme right, one at the center, and one at the extreme left. Alignment is taken along the tops of these posts and the radiator filler caps.

In column formation, standing trucks and sections are one behind the other, covered in file. The distance between vehicles is seven yards and between sections is 20 yards. The staff car is the leading vehicle of the column, covered at the prescribed distance by the company motorcycle. The first truck of

the first section covers the motorcycle. The supply truck covers the last truck of the third section at a distance of seven yards. The tank truck covers the supply truck and the repair truck covers the tank truck.

In column of sections the sections of a company are parked one behind the other, covered in file, the first section being the first line of trucks, covered by the second section, and the second section covered by the third section. The distance between trucks in line is two yards, the distance between sections is seven yards. The company motorcycle is two yards to the right of the first truck of the first section in line. The supply, tank and repair trucks are in line at the rear, on the extreme right, and at a distance seven yards from the line of trucks in the third section, covering the first four trucks of that section.

The distance between trucks of a section is two yards. The distance between sections is seven yards. The staff car is two yards to the right of the first truck of the first section, front wheel hubs in line. The company motorcycle is two yards to the right of the second truck of the first section, front wheel hubs in line. Tank No. 1 is two yards to the left of the third truck of third section, front wheel hubs in line; tank No. 2 is two yards to the left of the fourth truck of the third section, front wheel hubs in line. The repair truck is two yards to the left of the fifth truck of the third section, front wheel hubs in line.

The starting and stopping of a convoy is an important operation. All vehicles of a convoy must start simultaneously at a speed of two or three miles an hour for the first 200 yards, in order that the proper distance may be taken. Of course, getting out of the park the trucks can not all start at the same time. The first truck leads, the second truck follows and so on, but at a slow rate of speed.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course

FIELD WORK

LECTURE XI

FRENCH ROAD RULES AND REGULATIONS

It is absolutely necessary that you know French road signs because all along the French roads you will see these signs printed in black and white for day use and illuminated for night use. An illuminated sign is generally made in an ordinary box, coxered on one side by cloth with black letters painted on the cloth. They are placed on posts with a light inside the box. The light is very dim so aviators cannot see it, but you can see it from the road. These signs will give directions and will tell you whether or not there may be gas in that region. When you pass a *Gas* sign, it is the regulation that the gas mask be hung around the neck ready to put on, because you may have to use it on a few seconds' notice. Convoy routes are often subject to gas bombardment.

The most frequent road signs are the following:

Ralentir.....	Slow up
Passage a Niveau.....	Railroad grade crossing
Tenez Votre Droite.....	Keep to your right
Tournant Brusque.....	Sharp turn ahead
Croisement.....	Cross road
Virage.....	Sharp turn ahead
Cassis.....	Bad bump ahead
Sens Obligatoire.....	Must go in direction indicated
Sens Unique.....	One way only
Defense de Doubler.....	Do not pass any vehicle going in the same direction
Convois Double Circulation.....	Convoys must use road in both directions
Vitesse Maxima.....	Maximum speed
Defense de Stationner.....	Prohibited to remain stationary
Gaz.....	Gas

The signs: *Ralentir*—Slow up; *Tenez Votre Droite*—Keep to the right; *Sens Obligatoire*—Must go in direction indicated, are all very important. You will find one-way roads all along the front when traffic is allowed to go only in one direction. These roads are marked *Sens Unique*—One way only; *Defense de Doubler*—Do not pass any vehicle going in the same direction—is also important. The sign *Vitesse Maxima*—Maximum speed, is used a great deal at the front and indicates the speed limits. Sometimes these limits are a good deal lower than the usual average speed, in which case they are posted on this sign. The capacity of a bridge is posted on a similar sign near the *Vitesse Maxima*. Besides these most frequent signs there are a multitude of others, the meaning of which you will have to learn by actual experience while in France.

Noncommissioned officers and even drivers will realize how necessary it is for them to be able to read and understand French road signs when they are

called upon to take charge of independently working sections of trucks. Under such circumstances, which happen frequently, they are entirely thrown on their own resources, and on their knowledge of signs and map reading depends the success of the trip. For instance a convoy that has been working as a unit up to that point, reaches a junction in the road, where it is split, one section moving in one direction, two or three trucks in another and the rest going straight ahead on the main road. A little further on the convoy may be divided into still smaller units which proceed by different ways. The drivers and section chiefs in charge of these small units are responsible for the correct and prompt execution of the orders; which clearly shows the importance of studying signs and maps.

Another very important subject is the ammunition, supply and engineering dumps which have been referred to on previous occasions and of which this lecture will give you an idea. Most of the ammunition, engineering, and supply dumps, except where the material is stored in warehouses, are either in open fields or forests. It is not so necessary to camouflage the engineering material or supplies for the simple reason that even if they are bombarded there is no danger of explosion.

The ammunition dump is made as irregular as possible and the ammunition is scattered all over the field for the reason that if the dump is bombarded it would have to be hit a good many times to suffer much damage. As a further protection, sand bags are placed around the ammunition dumps. A dump consists of several yards between which there are roads for the trucks, which enter by a special entrance.

An interesting problem is the engineering or supply dump. The office is near the main entrance. The roads in the ammunition dumps are what we call corduroy roads, made of logs, which are fastened together with large staples. They are laid through the whole park and it is impossible to get a better road for use in a dump, as they afford good traction due to the rough surface. A truck rarely skids on them as long as it keeps squarely on the road, but if it slides off the road it is very difficult to bring it back again.

To avoid the danger of getting a wheel in the ditch, the best and most practical way is as follows: The first driver is at the wheel and the second driver is on the road in front of the truck. By a system of hand signals, the assistant directs the driver which way to go, so that all the latter has to do is to watch him. If these two men get their signals down in good shape, they will be able to place the truck in about half the time it would take one man to do it. If the man on the ground wants the driver to go straight back, he signals with his hands, the movement and speed of his hands indicating the direction and speed of the truck. Suppose the driver is going straight back, and a wheel of the truck begins to get a little off the right of the road. In this case the assistant will move his left hand in the direction the rear wheels are to be turned and vice versa. The truck is then backed in the direction of the hand signal.

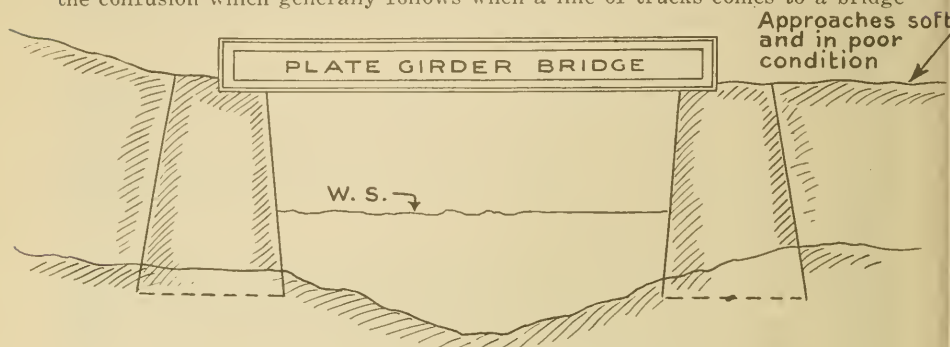
If the driver remembers that on the road and pays attention to the man ahead of him and assumes that he knows what he is doing, he will find he can back without difficulty no matter how narrow the place. In the American schools in France, the instructors will plant a couple of posts in the ground and make the men practice sometimes for hours backing between those posts. In this way the drivers in France learn to back their trucks.

When a section has completed loading at the dump during the day, the sergeant is given instructions by the company commander to proceed to the point of unloading. At night it is customary to form the whole company before leaving the park.

BRIDGES

As a rule the bridges in France are of huge I beams swung across the rivers. It is absolutely forbidden to have more than one truck at a time on such a bridge, and to enforce this the bridge is guarded.

The truckmaster should first secure the location of bridges from his map and on approaching one, order his trucks to spread out. This will eliminate the confusion which generally follows when a line of trucks comes to a bridge

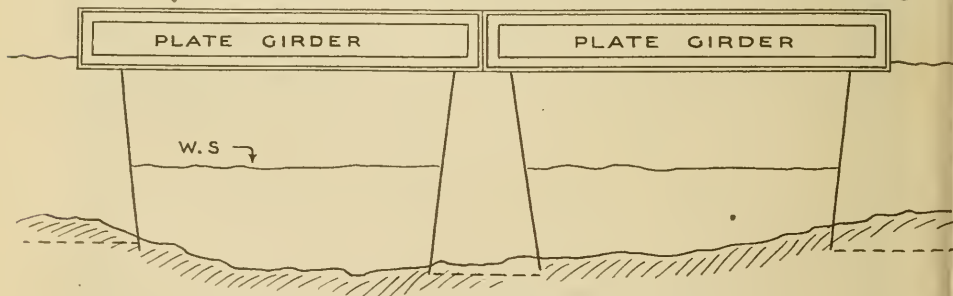


Only One Truck on Bridge at a Time

suddenly and has to slow down. If this precaution is taken, the convoy will pass the bridge without jamming and confusion. The first truck, after it has crossed the bridge, slows down to allow the other trucks to close up.

A great many military bridges are one-way bridges, and it is necessary to return by other roads. The same may be the case with bridges that will hold only empty trucks. It also frequently happens that a bridge which you have crossed in going out is destroyed by shell fire before you come back.

The officer or, if he cannot go out on the road, the truckmaster, should go ahead of his trucks and reconnoiter all bridges and determine first if a crossing

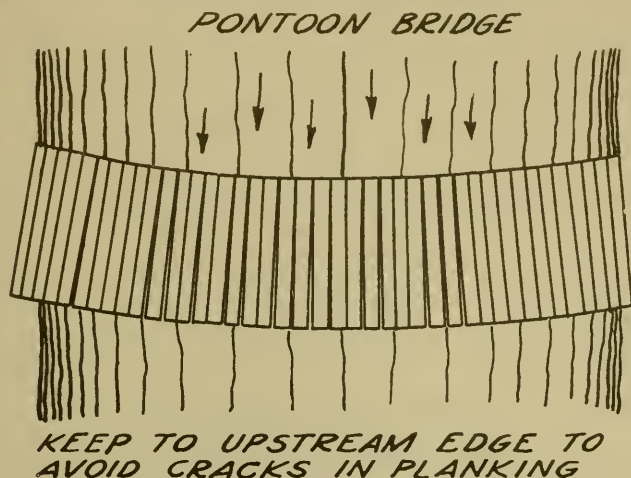


Only One Truck on Each Span at a Time

can be made. If he does not do so before the convoy arrives, he may have to turn his convoy around, and valuable time may be lost.

In crossing a bridge of two or three spans over a wide river, the regulations prescribe that one truck at a time is permitted on a span. When the first truck has crossed the first span, the second truck comes on the bridge.

Special care must be exercised in crossing a river by a pontoon bridge, with loaded or unloaded trucks. This type of bridge will be quite straight on canals, but on a river, where there is a current, the pontoon bridge will take a curved shape and there will be openings between the boards. When a bridge is laid the attempt is made to keep it straight, but the current will spread the bridge and great care must be taken to avoid accident.



The first and most important rule is to run very slowly. The approach to these bridges is usually very difficult. When the soil has been softened by rainy weather it is almost impossible to pass, as a skid might cause loss of control of the truck. In any case it is advisable to avoid a pontoon bridge, if possible.

MOTOR TRANSPORT CORPS

EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course

FIELD WORK

LECTURE XII

DISCUSSION OF NIGHT CONVOY

CORRECTIONS OF WORK DONE

INSTRUCTION ON FUTURE WORK

As this is of local nature, no set material is furnished. Each instructor is expected to give the time to a consideration of local work.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

MOTOR TRANSPORT CORPS
Motor Truck Officers' Course

FIELD WORK

LECTURE XIII

RELATIONS WITH FRENCH AUTHORITIES IN OBTAINING BILLETS

When troops are required to spend several days in or close to a town or village, certain rules are laid down for the conduct of the military in relation to the civilian population. They might be termed courtesies. The days have long since passed when a soldier quartered near, or billeted in, a town could do as he pleased without regard to the feelings of the civilians, merely because he carried arms.

Unless all arrangements have been made for the company, the company commander must observe the following rules:

(a) If possible, always reconnoiter the new site well in advance of the change, and consult with the military authorities of the place. Make sure of suitable billets, or camping ground, for the men and of parking space for the trucks. The two should be as near together as possible.

(b) The park for vehicles should never be on a dead end street or on soft soil. The vehicles should be kept together, so as to be more easily accessible and more easily guarded. If possible, keep them under cover of trees, so as to be less visible to enemy airplanes.

(c) Upon arrival, attend to the more important things first. Assemble the men and give them all necessary instructions. Establish guard, billet men, park vehicles, find out where to draw rations, and establish kitchen and mess facilities.

(d) Arrange for garbage disposal.

(e) Construct latrines, if necessary, according to standard specifications.

(f) Be sure of a good supply of drinking water and water for washing.

(g) Look up existing rules of the town, and establish police rules governing the men.

(h) Arrange for telephone connections.

(i) Find out locations of new ammunition depots, engineer parks, etc., to be served.

(j) Ascertain the location of the service park the company is assigned to.

(k) Arrange for gasoline, oil and wood supplies.

(l) When changing cantonment, if arrangements have not been made beforehand for the company, company commanders *must*, after reconnoitering the general site of the new cantonment, consult with the French and with the American authorities of the town or district. If in the zone of the armies, the "Major de Cantonnement," or military commander of the town will be looked up. Otherwise the "Maire" (Mayor).

(m) On leaving the cantonment, the company commander should make it a point to see that it is left clean. If desirable, a certificate may be obtained from the French authorities in proof of the fact that no material damage was caused by the company during its stay. (Called a *Certificat de bien vivre*).

In the territory of the S.O.S. towns are generally not under military control, and then of course it will be necessary to consult only with the civil authorities. A few additional rules may be added, such as: Do not park near a bridge. Remember that bridle paths along rivers and canals afford good parking. Barracks should be erected in sunny places rather than in heavily wooded districts. Crowding should be avoided for sanitary reasons, and barracks should be camouflaged and provided with anti-airplane curtains. Lights should not be shown, and windows should be fitted with tar paper curtains that can be rolled up. In some instances shelter dugouts are needed. If hard ground cannot be found for parking, crushed rock as a substitute must be used to give a formation to support the trucks and also give traction to the wheels. A company should not be split up when parked.

MOTOR TRANSPORT CORPS

EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course

FIELD WORK

LECTURE XIV

DISCUSSION OF NIGHT CONVOY

Discussion of previous afternoon and night convoys. Method of operation of night convoy in France.

DISCUSSION OF PREVIOUS AFTERNOON AND NIGHT CONVOYS

METHOD OF OPERATION OF NIGHT CONVOY IN FRANCE

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
FIELD WORK

LECTURE XV

INSPECTION FORMATION

Under ordinary circumstances notice of formal inspection will be issued sufficiently in advance to permit the men to prepare their vehicles for the occasion. When the time arrives for the inspection, the company commander will direct the truckmaster to proceed. The truckmaster will then form the company, and command: 1. *Prepare for inspection.* An interval long enough to permit the preparation of vehicles should intervene before the next command. 2. MARCH. At this command the company commander takes position one yard to the right and $2\frac{1}{2}$ yards in advance of the right front wheel hub of the staff car.

The second in command takes position one yard to the right and two yards in advance of the right front wheel hub of the staff car, facing the front.

The truckmaster takes position 18 inches to the right and $2\frac{1}{2}$ yards in advance of the right front wheel hub of the staff car, facing the front.

The assistant truckmaster of each section one yard to the right and $2\frac{1}{2}$ yards in advance of the right front wheel hub of the first truck of his section.

The chief mechanic takes position one yard to the left and $1\frac{1}{2}$ yards in advance of the left front wheel hub of the repair truck. The assistant mechanic takes position one yard to the rear of the assistant driver of the last truck in the first and second sections.

The driver of each truck takes position immediately behind the right front wheel hub of his vehicle, left sleeve touching the fender. The assistant driver takes position immediately behind the left front wheel hub, right sleeve touching the fender. The driver of the staff car takes position immediately behind the right front wheel hub of his vehicle, left sleeve against the fender.

The motorcycle rider takes position in line with the front wheel hub of his vehicle and against the side car.

In column formation the company commander takes position 2 yards to the right and 2 yards in advance of the right front wheel hub of the staff car. The truckmaster takes position 1 yard to the right and 2 yards in advance of the right front wheel hub of the staff car. The assistants take position as in inspection in company front. The chief mechanic takes position one yard to the front and one yard to the right of the driver of the repair truck. The assistant mechanic takes position one yard to the rear of the driver of the last truck in the first and second sections.

The driver and assistant driver take position as in formal inspection in company front.

The preparation of vehicles for all formal inspections are the same. The vehicles will be washed, all exposed mechanical parts requiring oil or grease will be washed with sal-soda solution, all black grease being removed. (Gasoline

line is not to be used for washing vehicles at any time. It is the duty of the company commander to see that this is obeyed) The new yellow grease must be oozing from all joints and knuckles requiring lubrication. After forcing the new grease through the joints, the grease cups must be filled and screwed down far enough to catch the threads.

The sides of the hood are to be removed and placed against each front fender. The wing nuts that hold the sides in place are to be placed on the hood rest. The outside of the motor is to be thoroughly cleaned, the mud pan removed, cleaned, and replaced. The tool box must be open and the equipment displayed; the tools must be clean and in good condition.

The hood top is raised and placed on the hood rest. The transmission, shifting levers, and steering apparatus are to be cleaned and absolutely free from grease on their exteriors. Floor boards, clean on both sides, are removed and placed on end against the running board, just below the seat frames. Tops must be raised and strapped in uniform position. Tarpaulins must be uniformly arranged if on trucks. Battery box covers are to be removed, cleaned and placed on end against battery box. The battery connections must be free from corrosion, vent plugs removed, and distilled water showing $\frac{1}{2}$ inch above the plates.

None other than a regulation truck equipment is to be kept in the tool box or compartments provided for equipment. The tail gate will be down, and the body thoroughly clean inside and out.

Note:—The position of the vehicles will be found in Lecture No. 10 of this course.

Informal inspection should be carried on continually by the commanding officer, truckmaster, assistant truckmasters, and mechanics. Informal inspections are made to ascertain the general appearance and condition of vehicles, and for the purpose of enforcing correct cleaning, oiling, greasing, and upkeep by drivers.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
FIELD LECTURES

LECTURE XVI

MOTOR TRANSPORT OFFICERS

The Motor Transport Corps, A.E.F., is under the direction of the Director, Motor Transport Services who is responsible to the Chief of Utilities for its efficient operation.

We will show on the next page the chart of organization of the M.T.C., A.E.F. to see at a glance the interrelations of the service.

Reference to motor vehicles unless exceptions are made will be construed to include all truck trailers, automobiles, motorcycles, bicycles, etc., in any service or staff corps whatsoever and for whatever purpose they may have originally been assigned. All motor vehicles with cargo carrying chassis are classed as trucks. Tractors, designed primarily for traction purposes, and tanks are excepted and do not come under the jurisdiction of this Service, their responsibility being charged to the Ordnance Department as are also their supply and maintenance. We may describe the functions of the Motor Transport Corps as follows:

- (a) The technical supervision of all motor vehicles.
- (b) The reception, storage, maintenance and replacement of all motor vehicles.
- (c) The storage and supply of spare and repair parts, tools, accessories and supplies of all motor vehicles.
- (d) The establishment and operation of all M.T.C. garages, parts, depots and repair shops.
- (e) The organization and technical training of M.T.C. personnel.
- (f) The salvage and reconstruction of damaged motor vehicles.
- (g) The homogeneous grouping of motor vehicles.
- (h) The operation, in accordance with instructions from the proper commanding officer as to their employment, of groups of motor vehicles of Class "A" as defined in the following paragraph:

Organization of the A.E.F.

Note: G1, G2, and G3, etc., denote one or more assistants in the General Headquarters regardless of rank.

With respect to the control exercised over them by the M.T.C. motor vehicles may be grouped into two classes, viz:

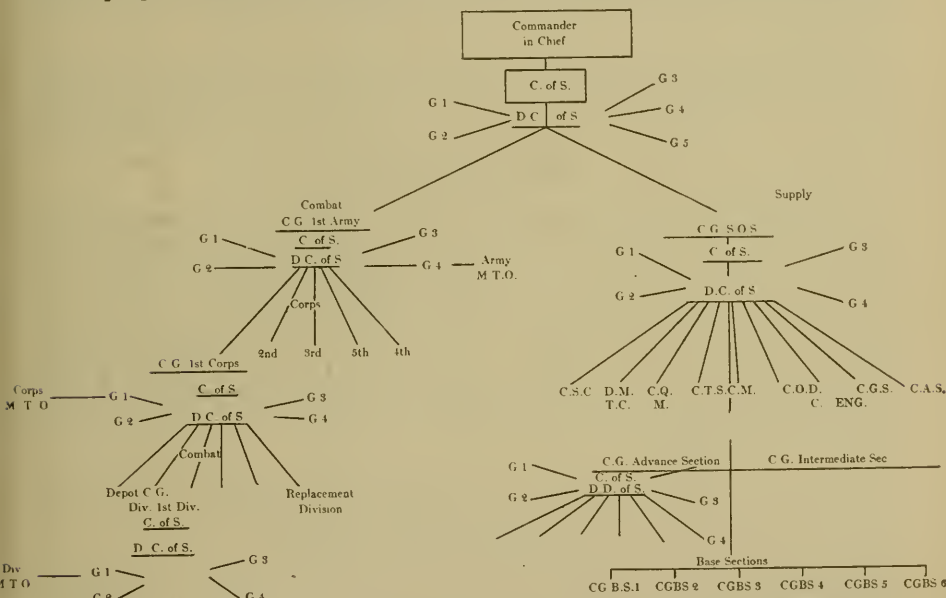
(A) Those whose operation the M.T.C. controls, and for whose efficient functioning as transportation units it is directly responsible.

(B) Those over which the M.T.C. exercises merely technical supervision.
Class "A" includes all cargo-carrying or passenger-carrying motor vehicles

used for general transportation purposes in the S.O.S., and the motorized portion of such reserve trains as may be held for general transportation purposes in or in rear of an army, under control of the army command.

Class "B" includes all motor vehicles not included in class "A." Substantially these will be such motor vehicles as are assigned by tables of organization to organizations such as divisions, corps and armies.

As explained above, the M.T.C. controls the operation of Class "A" vehicles, but merely maintains a technical supervision over the operation of Class "B" vehicles. This technical supervision will, however, be interpreted very broadly by all concerned. Bulletins will be published from time to time concerning the proper methods of operation, care and maintenance of motor vehicles. M.T. officers will keep themselves constantly informed as to how motor vehicles of the organization to which they are attached are being used, and will report to the proper commanding officer any abuse which they discover. The com-



manding officers to which such reports are made will hold to strict responsibility any officers who have motor vehicles under their control which have been in any way damaged or injured on account of disregard of the proper methods for operation, care and maintenance laid down by such bulletins.

It must be understood that when vehicles are placed in Class "A," the M.T. officer controlling them has no authority to determine the use to which they are put; he merely guarantees that they shall perform as efficiently as possible whatever work the commanding officer chooses to assign to them. It must be further understood that when vehicles are placed in Class "B" the commanding officer of the unit to which they are allotted is directly responsible for their efficient functioning, to the same degree as is the M.T. officer for vehicles in Class "A."

All garages, parks, depots, repair shops and similar establishments of the M.T.C. will be manned and operated by M.T. personnel, and their commanding officers will report direct to the M.T. officer on the staff of the unit or of the

section of the S.O.S., to which they are attached. The issue of stock from such establishments, the repair and replacement of motor vehicles, etc., will be done in accordance with the provisions of G.O. No. 44, H.A.E.F., 1918.

Motor vehicles and their spare parts, tools and accessories purchased by other staff corps or services, are turned over to the M.T.C. on their arrival in France and assigned by the M.T.C. as the best interests of the service dictate, regardless of their original course of procurement; except that ambulance, and non-cargo carrying motor vehicles such as machine shop trucks, gun mounts, rolling kitchens, laboratory trucks, water sprinklers, etc., will be held by the M.T.C. subject to the orders of the staff corps or service for which they have been purchased. In the case of such ambulance and non-cargo carrying vehicles, the M.T.C. will provide parking facilities for their reception and furnish facilities for the maintenance of the chassis and of such other parts as may be arranged for between the M.T.C. and the other staff corps or service concerned.

All questions which may hereafter arise affecting the design or construction of motor vehicles procured by or for any staff corps or service, in so far as concerns the chassis, or any element with the supply or maintenance of which the M.T.C. is concerned, will be decided by consultation between the staff corps or service concerned and the M.T.C. with a view of securing standardization of design and type and of facilitating repair and replacement.

Upon request of the Chief of a staff corps or service, there will be attached to the office of the Director M.T.C. at least one officer who will be the representative within the M.T.C. of the chief of that staff corps or service in all questions concerning motor transportation for that particular service.

In each army corps and division, and each section of the S.O.S., there will be an officer of the M.T.C. designated Motor Transport Officer of that command, who is responsible for the efficient operation of the M.T.C. within the limits of the command. His activities are controlled by G-1 in divisions or corps and by G-4 in armies, in the same manner as are those of the other representatives of technical and supply services in such commands. The functions of this officer are as follows:

First, he is in command of all motor transportation of Class "A," as defined above, and controls its operation. He is also in command of all M.T.C. maintenance and supply agencies on duty with the command.

The number of M.T.C. vehicles, units and personnel is based on the General Organization Project and on the Service of the Rear Project. The priority movement of all M.T.C. units from the U.S. to the theatre of operations under the above project is fixed in the priority schedule.

All requests for modification of existing projects, or for additional units, altered allowances of spare parts, machinery, etc., not provided by existing projects for all branches of the M.T.C. will be centralized in the office of the Director M.T.C. Such requests, as well as all requisitions for transmission to the War Department, will be submitted to the Commander in Chief, the various items of requisition being segregated under the different staff service headings so as to meet the requirement of existing law.

Second, he exercises the functions of a staff officer as regards supply of all M.T.C. property for the command and as regards the technical supervision over motor vehicles of Class "B."

To carry out this technical supervision, it will be his duty to make frequent inspections of all matters having any bearing on the motor transportation of the command. In making these inspections he will be afforded every facility

by all concerned. He will make frequent reports to the branch of the General Staff by which his activities are controlled, covering such matters as the suitability of the personnel charged with operating motor vehicles, the mechanical condition of the vehicles, the conditions under which they are operated, needs for repair or overhaul, carelessness or waste on the part of any individual or organization and similar matters, together with his recommendation as to any action that should be taken.

Regulations governing in detail the organization of the M.T.C., the organization and training of its personnel, the functioning of its establishments, the system of supply, repair, replacement and salvage of motor vehicles, spare parts, tools, accessories, etc., A.E.F. will be prepared by the Director M.T.C. for approval of the C. in C.

The following paragraphs have to do with the rules of the road and I would suggest that close application be given to them as you will continuously be running over roads policed by the French and the operations of convoys, etc., are all governed by hard and fast rules, where ignorance will not be accepted as an excuse. These roads and routes are of vital importance to the army, being lines of communication and at times play a very prominent part in extensive operations. So master them well as they will be of the greatest assistance in the days to come.

GENERAL ROAD RULES

1. Drivers will keep trucks on the right side of the road at all times, whether standing or moving.
2. In passing vehicles traveling in the same direction, the driver will pass on the left, and sound his horn.
3. A driver will always pass an approaching vehicle on the right and give it half the road.
4. Never block the road.
5. In passing a standing or moving convoy, a driver will slow down and sound his horn.
6. When convoy is halted, all men must be kept off the road.
7. The convoy must be kept together.
8. Assistant driver must at all times keep driver in touch with truck immediately behind, in order that speed may be uniform.
9. A driver will never abandon his vehicle except on order of his commanding officer.
10. Drivers will not permit unauthorized persons to ride on vehicles.
11. If any repairs are needed driver will report same immediately.
12. The military police on duty will be strictly obeyed.
13. The use of the muffler cut-out is absolutely forbidden at all times.
14. When vehicles are standing, motors will not be left running more than one minute.
15. Appropriate signals will be given when changing direction or stopping.
16. Examine amount of oil, gasoline and water after each stop.
17. Investigate and find the cause of all unusual noises.
18. Do not smoke while driving.
19. Engine is to be used as a brake when descending hills by shifting to lower gear.

20. When vehicle is stopped on a hill block the rear wheels.
21. Road signs and signals will be given strict attention.
22. Motor vehicles will not be driven by anyone except regular drivers or assistant drivers assigned thereto, unless in case of emergency.
23. *Never* use naked flame or oil lantern in filling gasoline tank or working on carburetor. Use electric torch.
24. When driving in cities, towns or villages, never double a vehicle moving in the same direction.
25. A slower moving convoy must never be doubled unless commander of over-taking convoy makes certain that doubling can be completed without confusion.
26. Never double a halted convoy, a halted body of troops or body of troops passing in same direction without first gaining consent of the officer in charge.

ROUTE GARDEE RULES

1. It is absolutely forbidden for any truck or section or column of trucks to double vehicles going in the same direction on military roads or *Routes Gardees*. Touring cars, ambulances, light delivery trucks, etc., may double other vehicles on *Routes Gardees* when traffic will permit.
2. Increase distance between sections to 50 yards on *Routes Gardees*.
3. Do not turn around on a *Route Gardee*.
4. All signs and notices on these roads will be strictly observed.
5. All instructions given by road guards, whether they contradict previous instructions or not, must be obeyed.
6. Vehicles will never be halted on a *Route Gardee*. If accident occurs vehicles must be moved to the extreme right hand side of the road, and if possible, completely off the road.
7. One-way roads marked as such, or *Sens Unique*, in France, are common at the front, and it is absolutely forbidden for any vehicle to go in any direction other than that indicated by the road signs.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
FIELD WORK

Typical Quiz Questions

Typical Quiz and Examinations Questions on preceding lectures of the course.

1. To whom is the Commanding General of the S.O.S. responsible?
2. There are two types of ground motor vehicles over which the Motor Transport Corps has no jurisdiction; what are they?
3. Who is responsible for the conditions of the roads over which the Motor Transport Corps has to travel?
4. What does the word "park" mean in the Motor Transport Corps.
5. Name three types of Motor Transport Corps parks.
6. In what park is the salvage section located?
7. If the commanding officer becomes a casualty who takes his place?
8. Why must the men keep off the road during a halted convoy?
9. What is the extent of authority of the Military Police over a *route garde*?
10. What meaning does *esprit-de-corps* convey to you? Give, if you can, an example in civil life.
11. What is the distance between companies when parking in the same area?
12. In the formation *column of trucks* what is the distance (a) between trucks; (b) between sections; (c) between companies?
13. Who superintends the lining up of each section in parking?
14. Who verifies the final alignment of trucks when parked?
15. Does the staff car have to hold to any specific distance in relation to the trucks during convoy?
16. In a more or less permanent park does each vehicle return to its same position? If so, why?
17. In what park is heavy machinery kept for repair purposes?
18. Where does a totally wrecked vehicle go?
19. Are the conditions of any field work in the present war always the same?
20. What is the best preventative of overlapping or confusion in the exercise of authority among individuals in the service?
21. Why it is that trucks and equipment are worth so much more in France than in this country?
22. Who draws the rations for a company?
23. In dealings with the Quartermaster or property officer of such a nature as not to require the commanding officer, who takes care of such transactions?
24. Give the three classes of trucks with their capacities.
25. Who has charge of the repair truck and the tools pertaining thereto?

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
CONVOY PREPARATION

Note to Instructor:

Lectures I to XVII inclusive cover material of a local nature and will be prepared by you. Each lecture will be of one hour's duration, and will include general instructions, announcements, assignments, criticisms, etc.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE I

ORGANIZATION OF WAR DEPARTMENT

ORGANIZATION OF ARMY

ORGANIZATION OF A.E.F.

THE WAR DEPARTMENT

Outline

War Department Defined.

The General Staff Corps:

- a. Chief of Staff.
- b. Division of *War Department General Staff*:
 1. Executive.
 2. War Plans.
 3. Army Operations.
 4. Purchase, Storage and Traffic.
- c. General Staff serving with Troops.

Special Staff Corps:

1. Adjutant General's Department.
2. Inspector General's Department.
3. Judge Advocate General's Department.
4. Quartermaster Corps.
5. Medical Department.
6. Ordnance Department.
7. Signal Corps.
8. Corps of Engineers.
9. Panama Canal.
10. Bureau of Insular Affairs.
11. Militia Bureau.
12. Bureau of Aircraft Production and Bureau of Military Aeronautics.
13. Chemical Warfare Service.
14. Motor Transport Corps.

THE WAR DEPARTMENT DEFINED

The President is the Chief Executive of the United States. Aiding him and serving him as his chief advisers are the members of his cabinet. To them he delegates his powers and authority as heads of the various departments of the government. Following is a list of the members of the Cabinet:

- | | |
|---------------------------|-------------------------------|
| 1. Secretary of State. | 6. Secretary of the Navy. |
| 2. Secretary of Treasury. | 7. Secretary of the Interior. |
| 3. Secretary of War. | 8. Secretary of Agriculture. |
| 4. Secretary of Justice. | 9. Secretary of Commerce. |
| 5. Postmaster General | 10. Secretary of Labor. |

The President is, by virtue of the power vested in him by the Constitution of the United States, *Commander-in-Chief* of the Armed Forces of the United States. He delegates his authority as such to the *Secretary of War*, also a civilian, who is a member of his cabinet and Head of the *War Department*.

The War Department is one of the main administrative departments of the United States Government. It is responsible to the President, to Congress, and to the people for the conduct of military operations on land whenever the United States is at war with any power. The above statement must be modified in two particulars: first, the Marine Corps, although conducting operations on land, is a branch of the Navy Department and is attached to the war vessels of the United States; second, in time of war the War Department sometimes engages in marine operations, as in transportation of troops and supplies, and may even conduct attacks on land fortifications from vessels under the direction of the Army. Whenever troops or supplies are transported, either on land or water, they are at all times under authority of the War Department, subject to whatever technical regulations the Navy Department may prescribe as to the operations of the vessels.

THE GENERAL STAFF CORPS

The *General Staff Corps* is the connecting link between the Army and the Secretary of War, who depends on it for expert advice in conducting the military business of the War Department. It keeps him informed as to the technical needs of the Army and advises him as to necessary legislation to be passed in order to secure funds and authority to conduct the work of the War Department. The *Chief of the General Staff Corps*, with the assistance of the War Council, is the immediate adviser of the Secretary of War in all matters relating to the military establishment, and he is charged with the planning and development of the army program in its entirety. The General Staff Corps is divided into two groups:

- (1) War Department General Staff serving in Washington, and,
- (2) General Staff serving with troops.

The duties of the War Department General Staff have increased so greatly that it has become necessary to organize it into a number of divisions.

EXECUTIVE DIVISION

<i>In Charge of:</i>	Executive Assistant to the Chief of Staff.
<i>Function:</i>	General administration information and direct conduct of minor affairs.
<i>Duties:</i>	(a) The supervision of the administration of the various bureaus and corps of the War Department including the other divisions of the General Staff. (b) The collection of statistics concerning troops, supplies and the war program in general. (c) Military intelligence concerning espionage and matters of a similar character. This section to be designated as the Military Intelligence Bureau.

- (d) Requisitions and permits.
- (e) Promotions and assignments.
- (f) The Militia Bureau and United States Guards.

WAR PLANS DIVISION

- In charge of:* Director of War Plans Division who is also *President of the Army War College.*
- Function:* Expert Advisory Committee to the Chief of Staff upon such purely military matters as new types of equipment, training and organization of the Army.
- Duties:*
- (a) Organization plans for the Army.
 - (b) Approval of designs, types and qualities of equipment.
 - (c) Projects for national defence.
 - (d) Collection of military records, including translation of foreign documents.

ARMY OPERATIONS DIVISION

- In charge of:* Director of Operations.
- Function:* The operation, recruitment, and mobilization of all branches of the service.
- Duties:*
- (a) Operations of all branches of the army, recruitment, mobilization, personnel, movements and distribution of troops.
 - (b) Assignment of equipment to all branches of the Army.
 - (c) Decisions as to camp sites, cantonments, posts.

PURCHASE, STORAGE AND TRAFFIC DIVISION

- In charge of:* Director of Purchase, Storage and Traffic.
- Function:* Supervision of the purchase and production of munitions and other supplies for the use of the Army; control of all transportation and storage facilities relating to the Army program.
- Duties:*
- (a) The determination of preference to be afforded manufacturers of supplies in the matter of shortage of fuel, power and raw materials.
 - (b) The co-ordination of all appropriations, estimates and requirements relating to supplies.
 - (c) The arrangement for the purchase, procurement and production of supplies, so as to utilize the industrial resources of the country to the greatest advantage.
 - (d) Movement of troops and supplies, including raw materials to points of embarkation, interior and overseas points, and in and out of storage.
 - (e) Control of Army Transports and supplementary shipping and arranging for the Navy Department for Convoy Service.

The Commander of the Field Forces is also advised and aided in his work by members of the *General Staff Corps* in the field, who usually act as chiefs of staff to tactical commanders.

SPECIAL STAFF CORPS

The plans and orders of the General Staff Corps are executed through the Special Staff Corps. The duties of these corps are as follows:

The *Adjutant General's Department* is the department of records, orders and correspondence of the Army and Militia. Among other things it prepares and distributes commissions, preserves records of officers and records of Army personnel and manages the recruiting service. (See A.R. 774.)

The *Inspector General's Department* exercises general and comprehensive observation over all that pertains to the efficiency of the Army. Its officers inspect and report on the condition and state of supplies of all kinds of arms, of barracks and quarters, the books and accounts of all disbursing officers, and discipline and efficiency of officers and troops. (See A.R. 878-84.)

The *Judge Advocate General's Department* is the custodian of the records of all general courts-martial, courts of inquiry and military commissions, and of all papers relating to title of lands under control of the War Department. The officers of this department render opinions upon legal questions when called upon by proper authority. (See A.R. 915-21.)

The *Quartermaster Corps* is charged with the duty of providing means of transportation of every character (except motor transportation) for the movements of troops and materials of war. It furnishes clothing, camp and garrison equipage, barracks, storehouses and other buildings, constructs and repairs roads and bridges, builds and charters ships, boats, docks and wharves used for military purposes. It supplies subsistence for enlisted men and others entitled thereto. It gives instructions for selling, issuing, and accounting for all quartermaster subsistence supplies; it has charge of the supply and distribution of and accounting for funds for the payment of the army and for such other essential duties as are not specially assigned to any other branch of the War Department. (See A.R. 1000-1009½.)

The *Medical Department* has charge of investigating and making recommendations concerning sanitary conditions of the Army. It has the duty of caring for the sick and wounded and making physical examinations of officers and enlisted men. It also manages and controls the military hospitals; and recruits, instructs and controls the enlisted force of the Medical Corps. It also furnishes all medical and hospital supplies. (See A.R. 1386-87.)

The *Ordnance Department* procures and distributes the necessary ordnance stores for the Army, and establishes and maintains arsenals and depots for their manufacture and safekeeping. *Ordnance and Ordnance Stores* include a vast variety of equipment, including fire-arms of all kinds. Under Ordnance are also included saddles, bridles, harness and horse equipment of all kinds (except for the Quartermaster Corps), sabers, bayonets, haversacks, waist belts, cartridge belts, soldiers' field mess kits and ammunition. (See A.R. 1511-12½.)

The *Signal Corps* has charge of military signal duties and of books, papers and devices connected therewith, including meteorological instruments for target ranges and other military uses. It constructs and repairs the military telegraph lines and transmits messages by telegraph or otherwise for the Army. (See A.R. 1536.)

The *Corps of Engineers* lays out camps, prepares military maps, selects sites, makes plans and estimates for military defenses, constructs and repairs fortifications, installs electric power plants, plans and superintends construction of defensive and offensive works in the field. In the time of actual or

threatened hostilities it has charge in the war zone of location, design and construction of all structures of general interest, such as hospitals and store-houses; of construction, making and repairing of roads, barracks and bridges, and of construction, maintenance and operation of military railroads, including the construction and operation of armored trains. (See A.R. 1493.)

The *Militia Bureau* has charge of supervising and standardizing the militia forces of the various states of the United States so that in time of emergency they can be coordinated with the other military forces of the Federal Government.

The *Panama Canal Bureau* and the *Bureau of Insular Affairs* are of minor importance and the discussion of the duties of these departments is omitted.

The *Bureau of Aircraft Production* and the *Bureau of Military Aeronautics* under the Army Air Service have been organized to take charge of the aircraft program. This work was formerly conducted by the Signal Corps. The Bureau of Aircraft Production exercises control over the procuring of supplies and the construction of airplanes. The Bureau of Military Aeronautics supervises the training of our aviators and our entire aviation program.

The *Chemical Warfare Service* has charge of and supervision of the investigation, manufacture, and production of toxic gases and gas defense appliances, the filling of gas shells and proving grounds utilized in connection therewith, and the necessary research connected with gas warfare.

The *Motor Transport Corps* has technical supervision of all motor vehicles, and of their design, reception, storage, maintenance, and replacement of all motor vehicles; spare and repair parts, tools and accessories, and accounting for same; the establishment and operation of all Motor Transport Corps garages, parks, depots and repair shops; the salvage and evacuation of damaged motor vehicles, the operation of motor vehicles, and the preparation of plans for hauling cargo and personnel.

ARMY ORGANIZATION

1. The Line and the Staff.
2. Army Units.
3. Military Ranks.
4. Field Service.

Service of the Interior

Territorial Departments.

Theatre of Operations,

Zones of Line of Communications,

Zone of the Advance.

LINE AND STAFF

The Army is divided, according to duty performed, into two main branches, namely, the "*Line*" and the "*Staff*."

The fighting units in the Army including both the mobile arms and the coast artillery are called "*Line*" organizations, while all branches that serve the line are called the "*Staff*" organizations.

The line is charged with the duty of meeting the enemy in actual combat and is relieved of every other duty. The main line organizations are the Infantry, Cavalry, Field, and Coast Artillery.

The Staff.

As the line must specialize in fighting it becomes the duty of the staff to take care of everything connected with the maintenance and equipment of the line. A few of these duties are:

1. Procure (by purchase or manufacture), store and distribute supplies and equipment of all kinds.
2. Transport troops and supplies.
3. Take care of all administrative functions which do not absolutely have to be performed by line forces.
4. Provide for the construction and maintenance of all buildings, roads, drainage, bridges, etc.
5. Attend to matters of health and sanitation, and to all casualties.

This immensely important task of serving the *line* is performed by the Special Staff Corps and Departments, such as the Ordnance, Signal, Medical, Quartermaster, etc., which were taken up previously in this lecture.

So closely related are *line* and *staff* duties under present conditions of warfare that an organization may partake of the functions of both. For example, the Corps of Engineers is charged with the duty of constructing military defense, bridges, and similar work. These are largely *staff* duties. At times, however, it comes in actual conflict with the enemy; for example, in sapping and the operation of armored trains, it is then performing *line* duties. The same condition applies to other of the auxiliary corps, such as the Aviation Corps, Chemical Service, etc.

ARMY UNITS

The line is divided into tactical and administrative units.

A tactical unit is any unit organized primarily for the purpose of military manipulation.

An administrative unit is created for the purpose of keeping record of the needs and achievements of the various elements and their personnel so that the tactical units can be most efficiently operated.

In the line organization no units are purely administrative, for example, the company and the regiment are both tactical and administrative.

The following is a table showing certain important units in Army organization, their commanders and their approximate strength.

			Commanded by
A Squad	consists of	from 6 to 11 men.....	Corporal
A Platoon	" "	3 or more squads.....	Lieut. or Sgt.
A Company	" "	2 or more platoons.....	Capt.
A Battalion	" "	2 or more companies.....	Major
A Regiment	" "	15 companies.....	Colonel
A Brigade	" "	2 or more regiments.....	Brig. Gen.
A Division	" "	3 or more brigades.....	Maj. Gen.
A Corps	" "	3 or more divisions.....	Lieut. Gen.
An Army	" "	3 or more corps.....	General

The normal strength of a squad, which is the fundamental unit, is eight men, seven privates and a corporal—two ranks of four files each.

The largest tactical unit outlined in the table of organization is the *Division*.

The Division is supposed to embrace all the elements of the Army and is a self sustaining unit, capable of operating indefinitely against the enemy. At present the tables of organization are changing and the government is not

giving out information as to changes. In the Official Bulletin for Sept. 22, 1917, the following outline of the present form of the Division was published:

<i>Organizations</i>	<i>Men</i>
1 Division Headquarters.....	164
1 Machine Gun Battalion of four companies.....	768
2 Infantry Brigades each composed of two Infantry Regiments and one Machine Gun Battalion of three companies.....	16,420
1 Field Artillery Brigade composed of three Field Artillery Regiments and Trench Mortar Battery.....	5,068
1 Field Signal Battalion.....	262
1 Regiment of Engineers.....	1,666
1 Train Headquarters and Military Police.....	337
1 Ammunition Train.....	962
1 Supply Train	472
1 Engineer Train	84
1 Sanitary Train composed of four Field Hospital Companies and four Ambulance Companies	940
Total.....	27,152

The chief changes from the former organization are: first, an increase in the ratio of Artillery of all classes to Infantry; second, a great increase in machine gun strength; third, the specialization of the Infantry in the use of hand and rifle grenades and other instruments of up to date fighting. The third change is brought out in the following outlines:

Infantry Regiment

1 Headquarters and Headquarters Company.....	303
3 Battalions of four Rifle Companies each.....	3,078
1 Supply Company	140
1 Machine Gun Company.....	178
1 Medical Detachment	56
Total.....	3,755

The size of the Headquarters Company is explained when we see that it includes the following:

1 Headquarters Platoon, including 1 Staff Section, 1 Orderlies' Section and 1 Band Section.....	95
1 Signal Platoon	77
1 Sappers and Bombers Platoon.....	43
1 Pioneer Platoon for engineer work.....	55
1 One-pounder Cannon Platoon	33
Total.....	303

Each rifle company has a strength of 250 men and six officers; it is composed of company headquarters (two officers and eighteen men) and four platoons. Each platoon includes:

	<i>Officers and Men</i>
1 Headquarters	2
1 Section Bombers and Rifle Grenadiers.....	22
2 Sections Riflemen, 12 each.....	24
1 Section Auto Riflemen, Four Guns.....	11
Total.....	59

RANK

Article III of the Army Regulations prescribes: "Military rank is that character or quality bestowed on military persons which mark their station and confers eligibility to exercise command and authority in the military service within the limits prescribed by law. It is divided into degrees or grades which mark the relative positions and powers of the different classes of persons possessing it."

Following are the grades of rank of officers and noncommissioned officers of the Army:

	<i>Insignia</i>
1. General.....	4 Silver Stars
2. Lieutenant General.....	3 Silver Stars
3. Major General.....	2 Silver Stars
4. Brigadier General.....	1 Silver Star
5. Colonel.....	Silver Eagle
6. Lieutenant Colonel.....	Silver Oak Leaf
7. Major.....	Gold Oak Leaf
8. Captain.....	2 Silver Bars
9. 1st Lieutenant.....	1 Silver Bar
10. 2nd Lieutenant.....	1 Gold Bar
11. Aviator.	
12. Cadet.	
13. Nurse (Army Nurse Corps).	

14. (1) Sergeant major, regimental; sergeant major, senior grade, Coast Artillery Corps; (b) quartermaster sergeant, senior grade, Quartermaster Corps; master hospital sergeant, Medical Department; master engineer, senior grade, Corps of Engineers; master electrician, Coast Artillery Corps; master electrician, Air Service; master signal electrician; band leader; (c) hospital sergeant, Medical Department; master engineer, junior grade, Corps of Engineers; engineer, Coast Artillery Corps.

15. Ordnance sergeant; quartermaster sergeant, Quartermaster Corps; supply sergeant, regimental.

16. Sergeant major, squadron and battalion; sergeant major, junior grade, Coast Artillery Corps; supply sergeant, battalion.

17. (a) First sergeant; (b) sergeant, first class, Medical Department; sergeant, first class, Quartermaster Corps; sergeant, first class, Corps of Engineers; sergeant, first class, Air Service; sergeant, first class, Signal Corps; electrician sergeant, first class, Coast Artillery Corps; electrician sergeant, Artillery Detachment, United States Military Academy; assistant engineer, Coast Artillery Corps; (c) master gunner, Coast Artillery Corps; master gunner, Artillery Detachment, United States Military Academy; band sergeant and assistant leader, United States Military Academy band; assistant band leader; sergeant bugler; electrician sergeant, second class, Coast Artillery Corps; electrician sergeant, second class, Artillery Detachment, United States Military Academy; radio sergeant.

18. Color sergeant.

19. Sergeant; supply sergeant, company; mess sergeant; stable sergeant; fireman, Coast Artillery Corps.

20. Corporal; corporal bugler.

In each grade and subgrade date of commission, appointment, or warrant determines the order of precedence. (C.A.R. No. 76, July 31, 1918.) (211.31, A.G.O.).

Officers of the same grade of the Regular Army, of the Organized Militia in the service of the United States, and of Volunteers take precedence in the order named. Officers of the Marine Corps, when detached for service with the Army by order of the President and while serving with the Army under that order, are upon equal footing with officers of the Regular Army and take precedence in each grade by date of commission.

Between officers of the same grade and date of appointment or commission, other than through promotion by seniority or appointment of enlisted men to the grade of second lieutenant under the act of July 30, 1892, relative rank is determined by length of service, continuous or otherwise, as a commissioned officer of the United States, either in the Regular Army or, since April 19, 1861, in the volunteer forces. When periods of service are equal, precedence will, except when fixed by order of merit on examination, be determined, first, by rank in service when appointed; second, by former rank in the Army or Marine Corps; third, by lot.

The relative rank between officers of the Army and Navy is as follows, lineal rank only being considered:

General with admiral.

Lieutenant general with vice admiral.

Major general with rear admiral.

Brigadier general with junior rear admiral.

Colonel with captain.

Lieutenant colonel with commander.

Major with lieutenant commander.

Captain with lieutenant.

First lieutenant with lieutenant (junior grade).

Second lieutenant with ensign.

"The insignia of rank in the Army and Marine Corps is worn on the shoulder straps and is the same for both arms of the service. Officers of the Navy wear the same insignia as those of the corresponding grades in the Army, but it is worn embroidered on the collar. The exception to this is in the case of an ensign who wears nothing corresponding to the gold bar of a second lieutenant."

FIELD SERVICE

In times of war, for purposes of administration, there are two main territorial divisions within which the Armies of the United States operate. These divisions are known as the *Service of the Interior* and the *Theatre of Operations*.

The *Service of the Interior* might be termed the working of the military establishment in the home country. The production, manufacture, and collection of supplies and equipment, and the raising, equipping and training of troops are included in this service. In the present war this service includes the whole of the United States and other sources of supplies and equipments. In order to facilitate the work of the Service of the Interior, the United States and its possessions have been divided into nine *Territorial Departments*. They are as follows:

Department	Headquarters
Northeastern Department.....	Boston, Mass.
Eastern Department.....	Governors Island, N. Y.
Southeastern Department.....	Charleston, S. C.
Central Department.....	Chicago, Ill.
Southern Department.....	Fort Sam Houston, Texas
Western Department.....	San Francisco, California
Philippine Department.....	Manila, P. I.
Hawaiian Department.....	Honolulu, H. I.
Panama Department.....	Ancon, C. Z.

Alaska is under the jurisdiction of the Western Department.

At the head of each Territorial Department is a *Department Commander* directly answerable to the War Department at Washington. He has his Territorial Department Staff which is modeled after that of the War Department at Washington. There is a Department Chief of Staff, a Department Quartermaster, a Department Ordnance Officer, etc., each having jurisdiction, under the Department Commander, over the matters pertaining to his corps in the department in which he is located. Ports of Embarkation, Depots, Concentration Camps and Cantonments are directly responsible to Washington even though located in a Territorial Department.

The work of the Service of the Interior is directed by the Secretary of War through the medium of his personal representative, the Chief of Staff. The Chief of Staff is assisted in this work by the newly organized bureaus, such as the War Council, and the War Industries Board. The work is carried on by the Bureau Chiefs (e.g., the Chief of Ordnance), Department Commanders, and in certain cases by commanders of concentration camps and ports of embarkation. The Bureau Chiefs are responsible for all military establishments placed under their orders and are charged with the accumulation of supplies and material and the forwarding of these to Post Commanders or elsewhere. Department Commanders are responsible for the recruiting, training and equipment of troops except at those camps which do not come within the jurisdiction of the Department Commander.

The *Theatre of Operations* is the whole area of land or sea in which fighting may be expected or in which movements of troops are liable to interference from the enemy.

Control of the Theatre of Operations is vested in one man, the Commander of the Field Forces, in the present instance by the Commander in Chief of the American Expeditionary Forces, General Pershing.

ORGANIZATION AND ADMINISTRATION OF A.E.F.

Under the Commander in Chief, General Pershing, are the Chief of Staff, Deputy Chief of Staff, and all the Assistant Chiefs of Staff.

The A.E.F. is divided into two main groups: Supply Services or Corps and the Combat Troops.

In practically every military organization of any size, there are two main functions: the *maintenance* or *supply* and the *operation*.

The Service of Supply, or S.O.S., extend from the Base Port to what is known as the Zone of the Advance. The S.O.S. is further subdivided into six Base Sections, an Intermediate Section and an Advance Section, the Commanding Generals of each of these sections being directly responsible to the Commanding General S.O.S., who is, in turn, responsible to the Commander in Chief.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE II

ORGANIZATION OF M.T.C. AS SEPARATE CORPS

APPOINTMENT AND REDUCTION OF NONCOMMISSIONED OFFICERS, OFFICERS' PAY,
MILEAGE, LEAVES OF ABSENCE, REPORTS, ETC.

ORGANIZATION OF M.T.C.

The Motor Transport Corps was created during the existing emergency by General Orders No. 75, War Department, dated August 15, 1918. The functions of the corps are as described in Lecture I. The term "motor vehicle" will be construed to include all bicycles, motorcycles, automobiles, trailers and trucks, by whatsoever staff, corps or service they may have been originally supplied and for whatsoever purpose. All motor vehicles with cargo-carrying chassis are classed as trucks. Tractors of the caterpillar type, designed primarily for traction purposes, and tanks, are excepted from the provisions of this order, the Ordnance Department being charged with the responsibility for their supply and maintenance.

Motor vehicles are divided into two classes:

The First Class includes all cargo-carrying or passenger carrying motor vehicles used for general transportation purposes and the motorized portion of such reserve trains as may be held for general transportation purposes in rear of an army, under control of the army commander.

The Second Class includes all motor vehicles not included in First Class. Substantially these will be such motor vehicles, as are assigned by Tables of Organization to organizations such as divisions, corps, troops and army troops.

The Motor Transport Corps controls the operation of vehicles of the First Class, but merely maintains a technical supervision over the operation of vehicles of the Second Class. This technical supervision will, however, be interpreted very broadly by all concerned. Bulletins will be published from time to time concerning the proper methods of operation, care and maintenance of motor vehicles. Motor Transport Corps officers will keep themselves constantly informed as to how motor vehicles of the organization to which they are attached are being used and will report to the proper commanding officer any abuses which they discover. The commanding officer to whom such reports are made will hold to strict responsibility any officers who have motor vehicles under their control, which have been in any way damaged, or injured, on account of disregard of the proper methods of operation, care and maintenance laid down by such bulletins.

When vehicles are placed in the Second Class, the Motor Transport Corps officer supervising them has no authority to determine the use to which they are put; he merely guarantees that they shall perform as efficiently as possible whatever work the commanding officer chooses to assign them.

When vehicles are placed in the Second Class, the commanding officer of the unit to which they are allotted is directly responsible for their efficient functioning, to the same degree as is the Motor Transport Corps officer for vehicles in the First Class.

All garages, parks, depots, repair shops and similar establishments of the Motor Transport Corps will be manned and operated by Motor Transport Corps personnel, and their commanding officers will report direct to the Motor Transport Corps officer of the staff of the unit, or of the organization to which they are attached.

Motor vehicles and their spare parts, motor vehicle shops and shop equipment, tools and accessories purchased by other staff corps or services will be turned over to and invoiced to the Motor Transport Corps and assigned by the Motor Transport Corps in accordance with the Tables of Organization, and as the best interests of the service dictate, regardless of their original source of procurement; except that ambulances and non-cargo and non-personnel carrying motor vehicles such as mobile repair shops, especially designed for Ordnance, Signal Corps and Engineer Corps, gun mounts, rolling kitchens, laboratory trucks, wireless trucks, photographic trucks, searchlight trucks, water sprinklers, will be held by the Motor Transport Corps subject to the orders of the staff corps, or service, for which they have been purchased. In the case of such ambulance and non-cargo carrying vehicles, the Motor Transport Corps will provide parking facilities for their reception and furnish facilities for the maintenance of the chassis and of such other parts as may be arranged for between the Motor Transport Corps and the other staff corps or service concerned. Proper accounting for all motor vehicles and for chassis of special vehicles above mentioned will be made to the Chief of Motor Transport Corps.

In each army, corps and division, the army artillery, and in each organization and station, there will be an officer of the Motor Transport Corps, or an officer acting as Motor Transport Corps Officer, designated Motor Transport Corps officer of that command, who is responsible for the efficient operation of the Motor Transport Corps within the limits of the command. His activities are controlled by G-1 in divisions or corps, and by G-4 in armies, in the same manner as are those of other representatives of technical and supply services in such commands. The functions of this officer are as follows:

First, he is in command of all motor transportation of the First Class, as defined above, and controls its operation in accordance with the instructions from the proper commanding officer as to its employment.

Second, he exercises the functions of a staff officer as regards the supply of all Motor Transport Corps property for the command and as regards the technical supervision over motor vehicles of the Second Class as provided for in the sixth and seventh paragraphs of this lecture.

To carry out this technical supervision, it will be his duty to make frequent inspections of all matters having any bearing on the Motor Transportation of the command. In making these inspections, he will be afforded every facility by all concerned. He will make frequent reports to the Divisions of the General Staff by whom his activities are controlled, covering such matters as the suitability of the personnel charged with operating motor vehicles, the mechanical condition of the vehicles, the conditions under which they are operated, needs for repair or overhaul, carelessness or waste on the part of any individual organization and similar matters, together with his recommendation as to any action that should be taken.

AMERICAN EXPEDITIONARY FORCES

The Motor Transport Corps is charged with the duty of handling, supervising and coordinating all matters relating to procurement, inspection, distribution, maintenance and operation of motor transportation, including trailers and bicycles, and excepting tanks, caterpillars and tractors, for the Expeditionary Forces, and to perform these duties in the most efficient manner possible. The following organization of the office of the Director of the Motor Transport Corps was ordered effective as of August 19th, 1918:

(a) *Director of Motor Transport Corps.*

Handles all matters relative to control, supervision and direction of the activities and personnel assigned to and attached to the Motor Transport Corps.

Deputy Director of Motor Transport Corps.

Acts for, and in the absence of, the Director and performs such other special duties as may be assigned to him by the Director.

Executive Officer.

Acts for, and in the absence of, both the Director and Deputy Director. Acts as the representative of the Director to insure the proper carrying on of the duties of the Corps.

(b) *Executive Division.*

This division has charge of the office management, personnel, statistics, accountability, leases, etc., and administration.

(c) *Supply Division.*

This division has charge of obtaining M.T.C. material from America, obtaining M.T.C. material from Europe, and warehousing and distribution of all supplies except assembled vehicles.

(d) *Repair Division.*

Has charge of repair and upkeep of all material, salvage of all material, interior equipment and arrangement of shops, and, jointly, with the Operations Division, the reconstruction parks.

(e) *Operations Division.*

Has charge of the assignment and distribution of vehicles, the operation of convoys and pools, the economical operation of all vehicles, and, together with the Repair Division, of reconstruction parks.

(f) *Engineering Division.*

Has charge of the experience tables of vehicle efficiency, research and development, and design and standardization.

(g) *Plans and Projects Division.*

Is responsible for keeping in touch with all military conditions affecting M.T.C. activity, the anticipation of M.T.C. responsibilities, the decision on locations, construction designs, amount of personnel, scope and equipment of all M.T.C. activities; after proper consultation with divisional heads, is charged with detailing arrangements for putting same into effect, and coordination of all M. T. C. plans and projects.

(h) *Inspection Division.*

The function of this division includes both technical and administrative inspection of M.T.C. activities.

(i) *Training Division.*

Has charge of the training of all technical personnel, training of all non-technical personnel, and training of personnel for other services.

(j) *Liaison.*

Coordination and cooperation between the M.T.C., A.E.F. and War Department; coordination and cooperation among the different corps and services of the A.E.F.

Base Section.

The base section has its reception parks, garages and service parks, the officers in charge of each of these being directly responsible to a district Motor Transport officer who is responsible through the Motor Transport officer of the base section to the office of the Director of Motor Transport Corps.

Intermediate Section.

This section maintains garages and service parks, the officers in charge of which are directly responsible to a district Motor Transport officer, and through the Motor Transport officer of the intermediate section to the office of the Director of Motor Transport Corps.

Advance Section.

The advance section maintains (a) overhaul parks and organization parks, the officers in charge of which are directly responsible to the Motor Transport officer of the advance section and through him to the office of the Director of Motor Transport Corps; (b) garages and service parks, the officers in charge of which are directly responsible to a district Motor Transport officer of the advance section to the Director of Motor Transport Corps.

Under the Division Motor Transport officers are the commanders of various service parks and trains. The division Motor Transport officer is responsible to the corps Motor Transport officer. There are also responsible to the corps Motor Transport officer the commanders of the corps service parks and trains not assigned to divisions within the corps. The corps Motor Transport officer is responsible in turn to the Army Motor Transport officer and there are also responsible to the Army Motor Transport officer the commanders of the service parks and trains which are not directly assigned to a corps with in the army. The Army Motor Transport officer is responsible to the office of the Director of Motor Transport Corps.

On the following page will be found a chart of control as previously described.

APPOINTMENT AND REDUCTION OF NONCOMMISSIONED OFFICERS

Battalion noncommissioned staff and company noncommissioned officers are appointed by regimental or separate battalion commanders, the former upon the recommendation of the battalion commander, the latter upon the recommendation of the company commander; in units not organized into regiments or separate battalions, by the unit commander with the approval of the next higher tactical commander, or of the chief of the service to which the particular unit belongs; and in division supply, ammunition, engineer, and sani-

tary trains, by the respective chief of service. On the recommendation of company commanders, company noncommissioned officers may be temporarily appointed by battalion commanders, under the conditions stated in paragraph 256 A.R.; but in no case will any company organization have an excess of noncommissioned officers above the number authorized by law. The noncommissioned officers of Coast Artillery Corps companies, upon the recommendation of company commanders, will be appointed by coast-defense commanders. (C.A.R., No. 66, Dec. 31, 1917.)

(300.31, A.G.O.)

To test the capacity of privates for the duties of noncommissioned officers company commanders may appoint lance corporals, who will be obeyed and respected as corporals, but no company shall have more than one lance corporal at a time, unless there are noncommissioned officers absent by authority, during which absences there may be one for each absentee.

The captain will select the first sergeant, quartermaster sergeant, and stable sergeant from the sergeants of his company, and may return them to the grade of sergeant without reference to higher authority.

Each noncommissioned officer will be furnished with a certificate or warrant of his rank, signed by the regimental commander; but a separate warrant as first sergeant, quartermaster sergeant, or stable sergeant will not be given. A warrant issued to a noncommissioned officer is his personal property. Warrants need not be renewed in cases of reenlistment in the same company, if reenlistment is made the day following the day of discharge, but, unless otherwise ordered by the regimental or coast defense commander, on the recommendation of the company commander, will remain in force until vacated by promotion or reduction, each reenlistment and continuance to be noted on the warrant by the company commander. The warrants for noncommissioned officers of the Coast Artillery Corps companies will be signed by the coast defense commander.

(C.A.R. Nos. 36 and 55.)

Appointments of company noncommissioned officers and cooks of the Medical Department will take effect on the day of appointment by the authorized commander, and of first sergeants, quartermaster sergeants, stable sergeants, chief mechanics, cooks, artificers, farriers, horseshoers, mechanics, saddlers, wagoners, musicians, trumpeters, and first-class privates on the day of appointment by the company commander; but in case of vacancy in a company absent from regimental and battalion headquarters a company commander may make a temporary appointment of a noncommissioned officer, which will carry rank and pay from the date of such appointment. Information of the appointment will be promptly sent to the regimental commander, and if he disapproves it the increased rank and pay will cease upon receipt by the company commander of such disapproval. (C.A.R., No. 55.)

A noncommissioned officer may be reduced to the ranks by sentence of a court-martial, or, on the recommendation of the company commander, by the order of the commander having final authority to appoint such noncommissioned officer, but a noncommissioned officer will not be reduced because of absence on account of sickness or injury contracted in the line of duty. If reduced to the ranks by sentence of court-martial at a post not the headquarters of his regiment, the company commander will forward a transcript of the order to the regimental commander. The transfer of a noncommissioned officer from one organization to another carries with it reduction to the ranks, unless otherwise specified in the order by authority competent to issue a new warrant.

When a company is serving in a different department from its regimental headquarters and at such a distance therefrom that more than 15 days are required for exchange of correspondence by mail, a noncommissioned officer may be reduced to the ranks, on recommendation of the company commander, by the order of the battalion commander, if such commander be in the same department as the company. When a company is serving in a different department from its regimental and battalion headquarters, and at such a distance from its regimental headquarters that more than 15 days are required for exchange of correspondence by mail, a noncommissioned officer may be reduced to the ranks, on the recommendation of the company commander, by order of the senior officer of the regiment on duty in the department in which the company is serving. (C.A.R., No. 45.)

When a noncommissioned officer, while in arrest or confinement, is reduced by sentence of a court martial, the date of the order publishing the sentence is the date of reduction. In all other cases reduction takes effect on the date of receipt of the order at the soldier's station. (C.A.R., No. 15.)

OFFICERS' PAY

Officers are paid monthly on accounts certified to by themselves on W.D. Form No. 336, Officer's Pay Voucher. This form should be made out and forwarded to the proper disbursing quartermaster not later than the day of the month specified in the particular command in which the officer is serving, which is ordinarily the fifteenth, twentieth or twenty-fifth of the month covered by the voucher.

With the first pay voucher submitted at a new post or station, the officer must furnish two copies of the order assigning him to duty there.

In the case of officers newly commissioned, there must appear on the pay voucher a statement of the date on which the officer accepted his commission.

An officer entitled to commutation of quarters, heat and light, is allowed commutation of quarters according to his grade, that is, two rooms for a second lieutenant, three rooms for a first lieutenant, four rooms for a captain, etc., at the rate of \$12.00 per room, but is allowed commutation of heat and light only for the number of rooms occupied not to exceed the number of rooms to which his grade entitles him.

The following is quoted from Army Regulations, paragraphs 1259 and 1259½:

"An officer about to embark for service beyond the sea and desiring to make provision for himself or his family in the United States, may send to the Depot Quartermaster, Washington, D. C., such full monthly accounts as he may elect, indorsing them as follows: "When due pay to.....," or "When due place to the credit of.....with.....," or "When due place to my credit with....." The Depot Quartermaster, Washington, D. C., will immediately notify the Department Quartermaster of the department where the officer is to serve of the months for which accounts have been so received, and will then pay them as they become due if the casualty list and stoppage circular show no bar to payment. If the officer be under orders to proceed to Alaska or the Canal Zone, or for service with an independent brigade or division, the notification will be sent directly to the Quartermaster where the officer is to serve. Should an officer already in service beyond the sea desire to have his accounts paid as described, he will forward them through the Department Quartermaster of the department where he is serving, to the Depot Quartermaster, Washington, D. C., except

when stationed in Alaska or the Canal Zone, or serving with an independent brigade or division, in which event the accounts will be forwarded through the local Quartermaster. Department and other quartermasters, through whom accounts are sent to the Depot Quartermaster, Washington, D. C., will make a record of the accounts so forwarded. (C.A.R., No. 9.)

An officer about to embark for service beyond the sea or already on oversea service who does not desire to dispose of his pay accounts as prescribed in the foregoing paragraph, may make an allotment of pay for the support of his family or dependent relatives, the difference between the amount so allotted and the total pay due to be drawn by the officer at the place where he is serving. This allotment must be in an amount less than the sum of the officer's monthly base and longevity pay, and the difference between the total pay due him and the amount allotted will be drawn at the station where he is serving on a pay account prepared to cover the total pay due with the notation: "Deduct for allotment \$" All allotments of pay will be paid by the Depot Quartermaster, Washington, D. C., as they accrue if the casualty list, stoppage circular, or other report shows no bar to payment.

An officer desiring to make an allotment of pay as herein provided will state his allotment on Quartermaster Corps Form No. 38a, which will be forwarded directly to the Depot Quartermaster, Washington, D. C., if the officer is under orders for oversea duty. The Depot Quartermaster will immediately notify the Chief Quartermaster or Department Quartermaster where the officer is to serve of the amount of the allotment and the period thereof. In case of officers under orders to proceed to Alaska or for service with an independent brigade or division, the notification will be sent directly to the Quartermaster where the officer is to serve. If the officer is at an oversea station when the allotment is made, he will forward the allotment form to the Depot Quartermaster, Washington, D. C., through the Chief Quartermaster or Department Quartermaster where he is serving, who will make record of the same. Should the allotment form not be available, the officer may make his allotment in the form of a letter reading:

I hereby allot \$ of my pay per month for months, commencing the 1st day of to, who is my and whose address is

Should the officer desire to have the amount of the allotment placed to the credit of his allottee with a bank, he will amplify his letter accordingly, giving the name and location of the bank. This letter should be forwarded in the same manner as is herein provided for the regular allotment form.

An officer who has disposed of his pay accounts as prescribed in the foregoing paragraph and who desires to substitute an allotment of pay therefor, should, in forwarding his allotment request the return of said pay accounts. The pay accounts will be returned by the Depot Quartermaster through the proper Quartermaster where the officer is serving.

Allotments of pay for purposes other than the support of families or dependent relatives, or by officers stationed within the continental limits of the United States, will not be permitted except when specially authorized by the Secretary of War, but this will not be construed as requiring discontinuance of allotment of an officer who is temporarily on duty in the United States or there on leave of absence from an over-sea station.

Should an officer desire to discontinue an allotment prior to the expiration of the period for which originally made, he will notify the Depot Quartermaster, Washington, D. C., specifying the date, which will be the last day of a month on which he desires the discontinuance to take effect. This notifica-

tion will be sent through the channels herein prescribed for forwarding allotments, and when practicable will be mailed sufficiently in advance of the date of discontinuance to insure receipt by the Depot Quartermaster before said date. In case there is any doubt as to the discontinuance being received through the mails prior to the date specified therein, the officer, at the time of mailing the discontinuance, will notify the Depot Quartermaster by telegraph of the date of discontinuance, such telegrams to be paid for by the officer. The Depot Quartermaster will acknowledge the receipt of all requests for discontinuance of allotments.

It shall be the duty of the immediate commanding officer of any officer who assumes a status which deprives him of pay to ascertain whether the officer has an allotment; and if so, to report the matter to the commanding general of the department or forces with which the officer is serving, who will notify the Adjutant General of the Army by telegraph to discontinue allotment, or to suspend further payments if the facts do not call for total discontinuance. (C.A.R., No. 62, Nov. 5, 1917.)

(243, A.G.O.)

MILEAGE

When an officer travels under competent orders he is entitled to reimbursement by mileage at the rate of 7 cents per mile. He may, if he so desires, secure from the Quartermaster Corps, transportation requests for the journey, exclusive of sleeping and parlor car accommodations, and the transportation so furnished will be charged against the officer's mileage account, deductions being made at the rate of 3 cents per mile.

Mileage accounts are made out on War Department Form No. 337, Mileage Voucher. When forwarded to the proper disbursing Quartermaster for payment this voucher must be accompanied by two copies of the order directing the travel. In order to collect mileage the order must contain the sentence: "The travel directed is necessary in the military service."

LEAVES OF ABSENCE

In time of peace an officer is entitled to one month's leave, or shorter leaves aggregating thirty days per year. During the existing emergency, however, it is the policy of the War Department that leaves should be granted only when justified by some urgent reason necessitating same.

An application for leave must state its desired duration and be forwarded to the proper commanding officer through military channels. Intermediate commanders will indorse thereon their recommendations.

A leave of absence commences on the day following that on which the officer departs from his station. The day of departure, whatever the hour, is counted as a day of duty; the day of return as a day of absence.

REPORTING FOR DUTY

Upon arrival at a post, camp or station to which he has been assigned for duty, the officer should immediately look up the adjutant and report to him, presenting a copy of the orders assigning him to duty there. The adjutant will then direct him in regard to reporting to the commanding officer, reporting to the personnel adjutant, assignment to quarters, arrangements for mess, etc.

MOTOR TRANSPORT CORPS

EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course

ADMINISTRATION

LECTURE III

ORGANIZATION OF MOTOR TRANSPORT COMPANY

DUTIES OF OFFICERS AND NONCOMMISSIONED OFFICERS

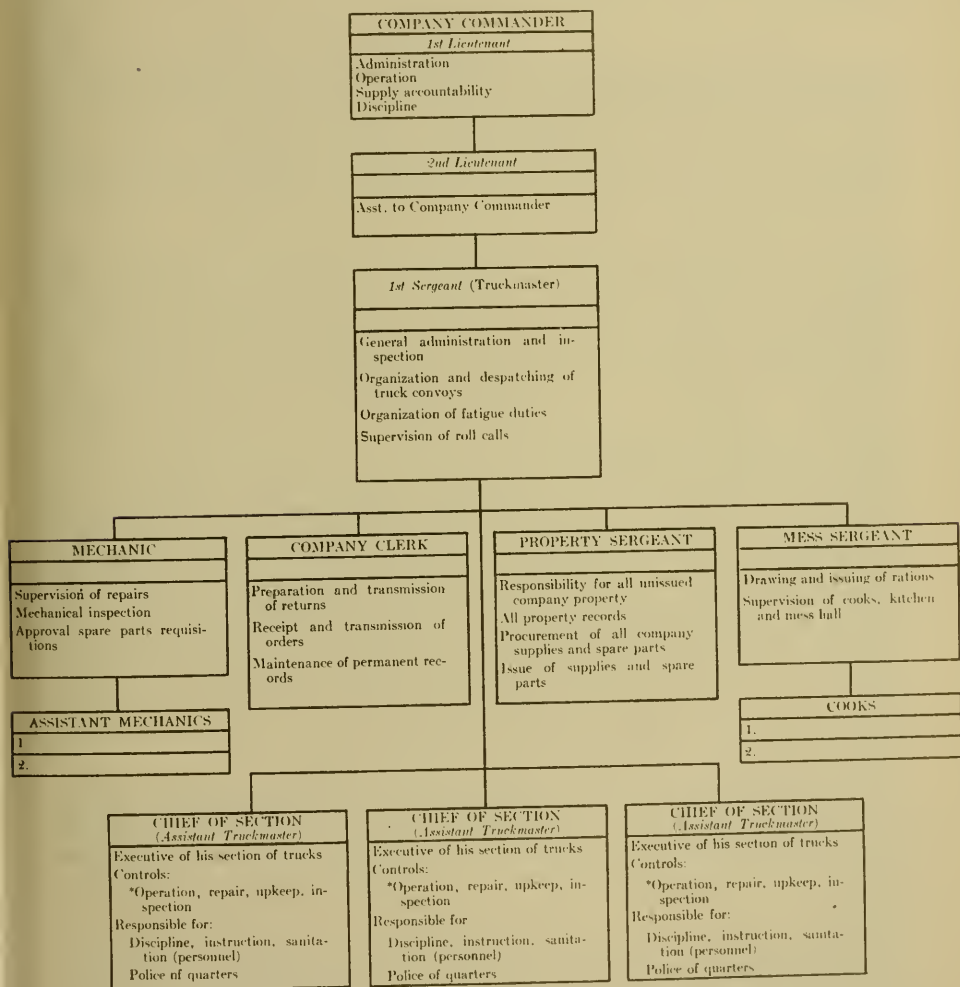
INSURANCE AND ALLOTMENTS

PAY OF TROOPS AND PAY CARDS

ORGANIZATION OF MOTOR TRANSPORT COMPANY

The following chart shows in graphic form the division of duties and responsibilities in the standard Motor Transport Company.

MOTOR TRANSPORT COMPANY ORGANIZATION



*Includes responsibility for drawing gasoline, oil and grease

The motor transport company is normally organized into three sections of nine trucks, each section under command of an assistant truckmaster. The service trucks, i. e., tank trucks, etc., are usually kept under the immediate orders of the truckmaster, as they do not form an integral part of the cargo sections. When the company is not operating in convoy, the service trucks may be assigned to cargo work, and in such cases should be attached to sections.

DUTIES AND RESPONSIBILITIES

(a) *Company Commander*.—He is responsible for the efficient operation, maintenance, and discipline of his company. He must constantly bear in mind that the value of his organization is measured by the efficiency with which it operates, and by its ability to cope with emergencies.

(b) *Second Lieutenant*.—This officer is the direct assistant of the company commander, and has such duties and responsibilities as are given him by the company commander.

(c) *First Sergeant*.—He is the truckmaster and the executive of the company. He sees that all orders, regulations, and other requirements are properly carried out; that the men perform their duties properly; and reports to the company commander any cases of neglect or violation of orders requiring disciplinary action. He should be a man chosen more for his administrative and executive ability and his efficiency in handling men than for his mechanical knowledge. The mechanic may well be chosen for his ability as a mechanic, irrespective of his ability to handle men, but the first sergeant should be a man of force, as his prime duty is to maintain discipline for the efficient operation of the company.

(d) *Mechanic and Assistant Mechanics*.—The mechanic and assistants are under the direct control of the first sergeant. The mechanic should be held responsible for the necessary repairs made to the mechanical equipment of the company. He is in charge of the repair truck, tools and equipment pertaining thereto. He should sign for the tool equipment and issue it to the assistant mechanics on proper receipts. He should be held responsible for this equipment, see that it is properly maintained and that any shortages by damage, loss, etc., are properly made up. Normally, he should see that the assistant mechanics are properly qualified, and should instruct them in their work. In order to perform their duties properly, the mechanic and assistant mechanics should be thoroughly familiar with the instruction books issued by the maker of the vehicles furnished to the company.

(e) *Company Clerk*.—He has charge of all records, reports and correspondence of the company. As he is habitually called upon to notify members of the company as to orders and instructions received, or to call upon them for the rendering of prescribed reports, and in consideration of other incidents where he must exercise authority, he has the rank of sergeant. Other duties for him are prescribed by the company commander according to local conditions.

(f) *Property Sergeant*.—He is responsible for all supplies and equipment not actually issued to individuals, and will keep the necessary records therefor. He is responsible, moreover, that all issues of property are properly receipted for by the persons responsible. He keeps the property under his charge clean and in proper order, and should have a list up to date of all property and its disposition. All dealings with the quartermaster or supply officer, not requiring the personal intervention of the company commander, should be carried on by him.

(g) *Mess Sergeant*.—He has direct charge of the mess hall, kitchen, and all matters pertaining thereto, including supervision of the cooks or other men working in the kitchen. He draws the rations, sees that they are economically used, makes up bills of fare, sees that the kitchen, mess hall and premises are clean and sanitary, and that all orders in reference thereto are properly carried out. His authority to contract debts, or expend money should be carefully watched and checked by the company commander personally. In some cases, the duties of mess sergeant are performed by the property sergeant, but this depends on the special aptitude of the man, as well as on other local conditions in the company.

(h) *Chiefs of Sections*.—Each chief of section (assistant truckmaster) is responsible for the discipline, instruction and all other matters pertaining to the personnel of his section; for the operation, repair and upkeep of the equipment assigned thereto. He is the intermediary between the men of his section and the truckmaster or company commander. His supervision extends to all the details connected with his section, including police and sanitation of quarters, seeing that his men are provided with the necessary equipment and clothing. All orders for his section, either regarding the members of his personnel or the units of his equipment, should be given to him. He should assure himself that his section is in proper condition at all times by making regular and systematic inspections of his men and equipment. He should examine all his vehicles on their return from work, and see that the drivers have taken proper care of them and that the proper repairs are made. In his absence, for any cause, a suitable man should be designated to perform his duties.

(i) *Driver*.—He keeps his vehicle and its equipment clean and in proper repair and working order. In order to do this, he utilizes his spare time while not on duty to do the minor work required thereon. He should be especially required to attend to the proper lubrication of all parts and truck mechanism, and to report promptly any defect noted or repair needed. In transporting material or supplies, he will see that the vehicle is not overloaded, that the cargo is properly loaded and lashed, and ordinarily he is responsible for its safe delivery. He should be familiar with the mechanism of his vehicle and its proper operation, and for this purpose he should be thoroughly familiar with the contents of the instruction book issued by the makers of the vehicle. He should be required to wear proper uniform when driving.

POLICY AND ATTITUDE OF COMPANY COMMANDER

The company commander should endeavor to standardize, in writing if possible, all important elements of company procedure. Unless all duties and functions are clean cut and clearly defined, an organization of the size of a motor transport company will become cumbersome and inefficient.

The development of company spirit, or esprit de corps, must be fostered in every way possible by the company commander. No one factor can be of more value in maintaining good discipline in the camp and on the road. See that the men are neat in their personal appearance and that their vehicles are at all times clean. Men can be led to take great pride in their trucks and in their work. The development of esprit de corps must necessarily rest very largely upon the personality of the company commander and the spirit which he instills into his non-commissioned officers and men.

The importance of relations of the Americans with the Allies, both civilian and military, must not be overlooked by the company commander. Differences in temperaments and points of view sometimes may lead to friction

between persons of different races, and company commanders should make use of their positions to overcome any friction that comes to their knowledge, and thus maintain the good relations that now exist. Company commanders should impress the importance of this subject upon all their men, especially upon their non-commissioned officers.

GENERAL REGULATIONS

The company commander should use the following as a guide for regulations which will be drawn up by him and posted for the company:

No alcoholic liquors of any kind are permitted within the limits of the camp.

Rules for sanitation to fit the given situation.

Latrines will be kept in sanitary conditions.

The men will be held pecuniarily responsible for loss or damage to any equipment whatsoever, which was clearly due to negligence or carelessness.

The rules of military courtesy briefly outlined and published.

Establish definitely the limits of the cantonment.

Impress upon the men the danger and prevalence of venereal disease and outline to them General Orders 77 A.E.F. 1917. Post rule regarding reporting for prophylactic treatment.

Post necessary fire regulations for quarters, kitchen, and trucks (particularly the handling of gasoline).

Establish guard rules.

Inspection of quarters, kitchen, personal equipment, and vehicles should be carefully and regularly made. Inspection under arms should be held weekly, preferably on Saturdays and muster days in the manner prescribed in Infantry Drill Regulations, followed by an inspection of vehicles.

SUGGESTED DAILY SCHEDULE

6:00 A. M. Reveille.

6:15 " Roll call, followed by short setting-up exercise.

7:00 " Breakfast.

7:30 " Camp police.

8:00 " Morning reports in, and sick call.

8:00 " Camp inspection; informal on week days and formal on Saturday.

8:15 " Drill.

9:30 " Work on trucks; miscellaneous work.

12:00 Noon Dinner.

1:00 P. M. Work on trucks; miscellaneous work.

5:30 " Supper.

6:00 " Town leave (not more than 20% of the men per evening, ordinarily).

9:00 " Taps.

INSURANCE AND ALLOTMENTS

ALLOTMENTS, ALLOWANCES AND COMPENSATION

By an act of Congress approved October 6th, 1917, the United States makes certain provisions for the families and dependents of the members of its Military and Naval Forces.

The law provides, in brief, the following:

- 1. For the support, during the war, of the families and dependents of *enlisted men*.
 - a. Allotments of pay. Certain proportions of pay are to be withheld from the men and paid directly to the families or dependents, or for insurance, or for other purposes. Allotments may be either compulsory or voluntary.
 - b. Family Allowances.
In addition to all allotments of pay by the man, the United States will pay monthly allowances to the wife, children, and certain dependents.
- 2. For the protection of both *officers* and *enlisted men* and their dependents from the hazards of injury, disease and death.
 - a. Compensation.
Monthly payments for disability and death due to injury and disease incurred in the line of duty.
 - b. Insurance.
Provided by the United States, upon application and payment of premium without medical examination, against total disability and death. Provision is made for the continuation of the insurance after leaving the service. This phase of the act is discussed in another lecture.

CLASSIFICATION OF ALLOTMENTS AND ALLOWANCES

Class "A," or compulsory, allotments are made to any of the following dependents who are known as Class "A" dependents; The wife or former wife divorced and not remarried, to whom alimony has been decreed; unmarried child under age eighteen, or of any age if the child is permanently helpless mentally or physically.

Class "B" or Voluntary Allotments may be made to any of the following classes known as Class "B" dependents when it is desired to have them receive a family allowance: Parents (including grandparents, and stepparents, whether the man or the wife), grandchildren, brothers and sisters, whether of the whole or half blood, or through adoption, or step brothers or step sisters.

Class "C" Allotments for War Risk Insurance.

Class "D" Allotments for premiums on insurance policies held in private companies, societies or organizations.

Class "E" all other allotments. These are known as "Army allotments," and are not handled by the Bureau of War Risk Insurance as are all other classes of allotments.

Class "A" Allowance—paid to Class "A" dependents.

Class "B" Allowance—paid to Class "B" dependents.

The total of Class "A" and Class "B" Allowance in no case exceeds \$50.00.

In case an enlisted man has any Class "A" dependents the Government compels him to allot to them \$15.00 per month in which case they receive the following family Allowances:

- (a) If there be a wife and no child..... \$15.00
- (b) If there be a wife and one child..... 25.00
- (c) If there be a wife and two children, with \$5.00 additional
per month for each additional child..... 32.50

(d) If there be no wife but one child.....	5.00
(e) If there be no wife but two children.....	12.50
(f) If there be no wife but three children.....	20.00
(g) If there be no wife but four children, with five dollars per month for each additional child.....	30.00

For a wife living separate and apart under court order or written agreement, or to a former wife divorced, the monthly allowance together with the allotment, if any, is not to exceed the amount specified to be paid to her.

Compulsory allotments may be waived on written consent of the wife or former wife, supported by evidence of her ability to support herself and her children. Upon application to the Bureau of War Risk Insurance, the soldier may also be exempted from these allotments when he can show good cause why he should not make them, as in the case of misconduct of his wife, or desertion on her part.

Class "B" Allowances are paid only if a member of this class is dependent upon the enlisted man and in that case only while he is making an allotment of pay to the member or members of this class.

In order that these dependents may receive the family allowance the soldier must allot to them \$15.00 per month if he is making no allotment under Class "A" and \$5.00 per month if he is making Class "A" Allotment.

Class "B"—Schedule of Family Allowances.

Grandchild, parent, brother or sister.

(a) If there be one parent.....	\$10.00
(b) If there be two parents.....	20.00
(c) For each grandchild, brother, sister and additional parent..	5.00

The foregoing table is subject to the provision that the allowance added to the allotment is not to exceed the average sum contributed monthly by the soldier to Class "B" dependents during the year preceding his enlistment or the passage of the law. Also if an allowance is being paid to Class "A" dependents, the allowance to Class "B" shall not exceed the difference between the allowance paid to the beneficiaries of Class "A" and the sum of \$50.00.

Class "C" allotments are those made to cover premiums for war risk insurance. These are, of course, voluntary and are conditional on the soldier's application for insurance.

Class "D" allotments are those made by soldiers to cover premiums on insurance policies held in private companies, societies, and organizations. The Government arranges that policies thus protected cannot be cancelled by the insurance companies.

Class "E" embraces all other allotments including all allotments made to Class "A" or Class "B" dependents above the amount necessary to receive the family allowance; also for Liberty Loan Bonds, to banks for saving purposes, or to friends or relatives other than those in the above mentioned classes. This class of allotment is subject, however, to any limitations which may be prescribed under regulations to be made by the Secretary of War.

Every enlisted man in the Military or Naval Forces of the United States must fill out Form 1-B, Bureau of War Risk Insurance, (application for family allowance and allotment of pay). A man who has no dependents is required to sign and execute the form, filling the word "None" in the proper spaces.

This form is made out and signed in duplicate under the supervision of the company, or detachment commander, who forwards the original to the division, department, port of embarkation, or recruiting depot commander, as the

case may be, retaining the duplicate for file with the records of the company or detachment. The division or other commanders to whom the original application is forwarded causes it to be carefully examined, and unless found to be incomplete or improperly executed, transmits it directly, except as hereinafter indicated, with a letter of transmittal giving the name, rank and organization of the applicant to the Bureau of War Risk Insurance, Washington, D. C. When an application is incomplete or improperly executed, it is returned to the company or detachment for correction before transmittal to the Bureau of War Risk Insurance or to the Quartermaster General. The necessary changes are made on both the original and duplicate copies.

In the case of the American Expeditionary Forces in Europe, the war risk insurance forms are filled out and signed in triplicate; the original and one copy to be forwarded through the division commander to the Commanding General, American Expeditionary Forces, who transmits the original directly to the Bureau of War Risk Insurance, Washington, D. C., retaining the copy for file at his headquarters.

Form No. 2-A, Bureau of War Risk Insurance, is used for Class "C" Allotments.

Form 38 Q.M.C. is used for Class "E" Allotments, but if such form is not available the allotment may be made by letter. This form is handled in the same manner as form 1-B but is finally forwarded to the Central Disbursing Division—Office Q.M.G. at Washington, D. C., instead of the Bureau of War Risk Insurance. This form is also used for making Class "D" allotments for outside insurance.

Before witnessing a Class "E" Allotment the company or department commander satisfies himself that the allotment is not made for the purpose of obtaining an advance of the soldier's pay. When a bank is designated as allottee, the company or detachment commander furnishes the bank with the signature of the grantor, and informs it of the amount and period of allotment. The commanding officer also, if possible, satisfies himself that the bank has an existence.

When troops arrive overseas, a report is made to the Commanding General, American Expeditionary Forces, by the commanding officer, showing the number of officers and enlisted men that have not submitted applications for insurance or family allowance under the War Risk Insurance Act. Organizations are not required to furnish to any headquarters or war risk section in France any copy of insurance or allotment applications executed prior to leaving the United States.

CHANGES

In case of any change affecting the allotment (Class "A" or "B"), the family allowance of the insurance of an enlisted man, the company or detachment commander causes a new form to be prepared and forwarded, as provided for original applications, showing plainly on it that the new application is an amendment to an application previously forwarded and marking the new form in a conspicuous place with the word "change."

Discontinuances of allotments under the war risk insurance act are made by letter or by use of another form (1-B or 2-A) marked "Change." This discontinuance is sent through usual channels to the Bureau of War Risk Insurance.

Class "E" Allotments will be discontinued on Q.M.C. Form No. 39 which will be forwarded direct to the Central Disbursing Division—Office of the Q.M.G.

PUNISHMENT FOR FRAUD

Since the word of the soldier is taken as regards the actual dependency of those for whom the allowance is asked, a severe penalty for misstatements is provided. The maximum punishment is a fine of \$5,000.00 and imprisonment for two years.

COMPENSATION

Compensation, which applies to both officers and enlisted men, is the outgrowth of the old pension plan. It is payable for death or disability resulting from personal injury suffered or disease contracted in line of duty. Its cost is paid by the U. S. Government without contributions from the soldier himself.

Death.

In case of death resulting from injury, the monthly compensation to the widow, child, or dependent widowed mother, is as follows:

(a) For a widow alone.....	\$25.00 per month
(b) For a widow and one child.....	35.00 per month
(c) For a widow and two children, with \$5.00 additional for each additional, up to two.....	47.50 per month
(d) If there be no widow, then for one child.....	20.00 per month
(e) If two children.....	30.00 per month
(f) If three children,, with \$5.00 additional for each child up to two.....	40.00 per month
(g) For a widowed dependent mother.....	20.00 per month

The payment to a widowed mother is subject to the provision that if payments are being made to a widow and children, the total amount of compensation for the payments made to all may not exceed \$75.00 per month.

Total Disability.

In case of total disability the soldier himself receives:

If he has neither wife nor child living.....	\$30.00 per month
If he has a wife but no child living.....	45.00 per month
If he has a wife and one child living.....	55.00 per month
If he has a wife and two children living.....	65.00 per month
If he has a wife and three or more children living.....	75.00 per month
If he has no wife, but one child living, with \$10.00 additional for each child up to two.....	40.00 per month

If he has a widowed mother dependent upon him for support, then in addition to the above amounts, \$10.00.

To an injured person so helpless as to be in constant need of a nurse, an additional sum is to be paid, but it is not to exceed \$20.00 per month. Also in the event of the loss of both feet or both hands, or, becoming totally blind or helpless or permanently bedridden, the rate of compensation is to be \$100.00 per month.

Partial Disability.

In case of partial disability the monthly compensation is a percentage of the compensation which would be payable if totally disabled. The amount will be estimated at the average reduction in working ability which such injuries caused.

The Government further intends to re-educate maimed or otherwise injured soldiers, that they may not remain permanently helpless. It is specifically provided that to receive compensation, the soldier must take the course of instruction which will be provided. Refusal to take the course will be grounds for suspension of payment of the compensation.

But the fact that after such education the soldier may be able to earn more money than he was before being injured will not operate against his continuing to receive his compensation. The vocational education is insisted upon solely for the purpose of preventing the soldiers thus injured from becoming shiftless and depending upon the government bounty for their support.

INSURANCE

Separate and distinct, and in no way affecting compensation, is the War Risk Insurance. Knowing the dangers to which every soldier is subject, and the possibility that he may be so injured in the service as to be uninsurable by corporate insurance companies after the war, and considering the soldier's responsibility to his family and other dependents, the Government has provided insurance against death and total disability at extremely low rates. The Government is paying all overhead expenses and bearing the extra cost of the war hazard.

Insurance may be taken out in amounts which are multiples of \$500.00, but no policy for less than \$1,000.00 or more than \$10,000.00 will be issued.

This is insurance against death and total permanent disability, and payment is made whether death or permanent disability arises in line of duty or not. In the event of death, beneficiaries will receive monthly installments of \$5.75 for each \$1,000.00 of insurance held, for 240 months. The beneficiaries may be changed at any time. In the case of total disability, the same monthly payments will be made for the rest of the soldier's life even if the period is greater than twenty years.

Any of the following may be named beneficiaries: wife; child, grandchild, brother, sister, parent, grandparents, and step-parents. The premium rates increase as the soldier grows older as shown in the table on reverse side of application blank.

Premiums are payable monthly by means of allotment by the enlisted men and by deduction notation on pay voucher of an officer. Premiums can be paid quarterly, semi-annually, or annually in advance by means of a draft or certified check.

War risk insurance is in force during the war and for five years after its close. Within five years after the war it must be converted into ordinary life, endowment, continuous installment, surrender values, and other forms of insurance to be specified by the Government. No medical examination is required for those taking out policies originally, and no medical examination will be required at the time of conversion.

Terms as used in the War Risk Insurance Act defined.

(1) The term child includes:

- (a) A legitimate child.
- (b) A child legally adopted more than six months before the enactment of this amendatory act, or before enlistment or entrance into, or employment in, active service in the Military or Naval Forces of the United States, whichever of these dates is the later.
- (c) A stepchild is a member of a man's household.
- (d) An illegitimate child, but as to father only, if acknowledged by instrument in writing by him.

(2) The term grandchild means a child of a child as above defined.

(3) The term parent includes father, mother, grandfather, grand-

mother, stepfather, and stepmother, either of the person in the service or of the spouse.

- (4) The term brother and sister includes brothers and sisters of the half as well as those of the whole blood. Stepbrothers and step-sisters and brothers and sisters through adoption.
- (5) The term commissioned officer includes a warrant officer, but includes only an officer in active service in the Military or Naval Forces of the United States.
- (6) The terms man and enlisted man mean a person whether male or female, and whether enlisted, enrolled or drafted into active service in the Military or Naval Forces of the United States, and include non-commissioned and petty officers and members of training camps authorized by law.
- (7) The term enlistment includes voluntary draft and enrollment in active service in the Military or Naval Forces of the United States.
- (8) The term commissioner means the Commissioner of Military and Naval Insurance.
- (9) The term injury includes disease.
- (10) The term pay means the pay for service in the United States according to the grade and length of service, excluding all allowances.
- (11) The term Military and Naval Forces means the Army, and Navy, Marine Corps, Coast Guard, the Naval Reserve, the National Naval Volunteers, and any other branch of the United States Service while serving pursuant to the law with the Army or Navy.

THIRD PARTIES MAKING APPLICATION FOR INSURANCE

Third parties cannot make insurance applications without authorization by officer or enlisted man making such person his agent in applying for such insurance. This ruling will require that in those cases in which the third parties have applied for such insurance the officer or enlisted man must, by formal or informal writing, authorize such person as his agent. Subsequent ratification is equivalent to previous authorization. (Opinion of the Attorney General of the U. S.)

Rules Relating to Prorating Insurance Premiums.

Premiums at the beginning of insurance contract shall not be prorated for the portion of the calendar month in which insurance is applied for. The full month premium is payable on or before the end of the calendar month in which the application is made.

At the time of leaving the service no action need be taken by the Army in adjusting insurance premiums, either by deduction from pay in respect of days elapsed since the end of the previous calendar month or by refund in respect of days for which insurance premiums have already been collected.

At the time of leaving service insured should receive explicit notice that he must pay premiums direct to the Bureau of War Risk Insurance, Treasury Department, Washington, D. C., if he wishes to continue the insurance, check or money orders to be drawn to the order of the Treasurer of the United States. He should be notified in writing of the date and amount of such premium payments and this bureau notified at the same time by duplicate memorandum that such action has been taken.

PUNISHMENT FOR FRAUD

The attention of every person making claim for family allowance, compensation or insurance will be directed to sections 25 and 26 of the act which read as follows:

(25) That whoever in any claim for family allowance, compensation or in any document required by this act, makes any statement of a material fact, knowing it to be false, shall be guilty of perjury and shall be punished by a fine of not more than \$5,000.00 or two years imprisonment or both.

(26) That if any person entitled to payment of family allowance or compensation under this act, whose right to this payment under this act ceases upon the happening of any contingency, thereafter fraudulently accepts any such payment, he shall be punished by a fine of not more than \$2,000.00 or by imprisonment for not more than one year, or both.

CHANNELS OF COMMUNICATION WITHIN THE ARMY AND TO AND FROM THE BUREAU

Except as otherwise provided all communications to and from the Bureau of War Risk Insurance concerning the administration of the act will be transmitted through the commander of the department, division, recruiting depot, or the port of embarkation concerned. Commands ordinarily exempted from the control of department commanders and not enumerated above, will for the purposes of the War Risk Insurance Act, be considered as a part of the department in the territorial limits of which they are situated. Communications concerning personnel stationed in Europe will be transmitted through general headquarters, American Expeditionary Forces.

Communications relative to military policy or Army administration will be addressed to the Adjutant General of the Army. Communications relating in any way to deceased officers and enlisted men, and to those discharged or otherwise separated from the service will invariably be addressed to the Adjutant General of the Army except as provided below.

APPOINTMENTS OR DESERTION

In case of death, discharge, appointment as commissioned officer, or desertion of an enlisted man, his company or detachment commander will report such fact with the date of death, discharge or desertion, or acceptance of appointment direct to the Adjutant General of the Army. Such report to be sent by telegram if death, discharge or desertion occurs after the twentieth of the month. In Philippines, Hawaiian and Panama Canal Departments and in the American Expeditionary Forces the reports will be made to the commander of these departments or forces, who will transmit the information to the Adjutant General of the Army by cable. In case of death this report will show the amount of insurance in effect at date of death. The Adjutant General of the Army will at once notify the Bureau of War Risk Insurance and the depot Quartermaster, Washington, D. C.

APPLICATION FOR INSURANCE

When a man desires to take out War Risk Insurance with the government of the United States a form (Form 2A) supplied by the Bureau of War Risk Insurance is filled out. The form is made in duplicate by, or under the super-

vision of, the man's detachment or company commander. It is signed by the party making application for the insurance, witnessed, and then signed by the company commander. The duplicate is attached to the Service Record of the man who has taken out insurance. The original is forwarded to the Division Commander or corresponding official, who checks the application to see if it is incompletely or improperly executed. Applications which have been properly filled out are sent to the Bureau of War Risk Insurance. In case error occurred in making out this form, the form is returned for correction to the company from which it came.

Should insurance be taken out in Europe, the blank is made out in triplicate, The original and one copy is forwarded through the division commander to the Commanding General, American Expeditionary forces, who retains the copy and transmits the original to the Bureau of War Risk Insurance.

Sometimes it happens that a soldier carrying insurance will desire to increase the amount of his insurance or make some other change. The following from a memorandum sent out by the Bureau of War Risk Insurance (on June 10, '18) covers the procedure that should be followed in such cases:

"Whenever a 'Change' for 2-A (Application for Insurance) is prepared, a notation will be made at the bottom of the Form as to the character of the 'Change'; for example:

"This application for additional insurance. Original for \$5,000.00 submitted January 1, 1918."

Insurance must be applied for within one hundred and twenty days after the enlistment or after entrance into employment in the active service, and before discharge or resignation.

The soldier holding a policy may cancel it at any time he desires, by notifying the War Risk Insurance Department at Washington, D. C.

PAY OF TROOPS

Until recently the company commander made up the pay roll for his company or detachment and was responsible for the entry thereon of all remarks that in any way affected the pay of the men in the organization. This, together with the preparation of bi-monthly muster rolls, involved a great deal of work on the part of the company. A new system has, therefore, been adopted whereby a personnel officer is attached to each regimental staff, whose duty it is to prepare pay rolls for all the organizations of the regiment. (muster rolls are discontinued).

PAY CARDS

The basis of this system is the pay card (A. G. O. Form No. 644), one of which is prepared and kept for each enlisted man by the personnel officer. On this is recorded all information concerning the pay status of the soldier. From these cards the personnel officer prepares pay rolls for the various organizations.

The company commander is not entirely relieved, however, of all duties pertaining to the pay roll. He must furnish the personnel officer with all information that comes to his official attention affecting the pay status of any man in his company. This he does by advising the personnel officer of appointments and demotions made in his company, by reporting losses and damage to property which are chargeable to the men, and all similar information. These advices accompany the morning reports each day, and enable the personnel officer to keep the pay cards up to date.

Preparation of Pay Cards by Personnel Officers

The company or detachment commander furnishes the personnel officer with all data required for the preparation of the pay cards and pay rolls, and co-operates with him and renders such assistance as may be necessary to insure a complete and accurate account being kept of the pay of each and every enlisted man of his command.

A pay card must be carried for each enlisted man in the Army. Notations of changes in pay status are made on the pay card from day to day as the changes occur. The grade and organization of the soldier are written lightly in pencil immediately below his name at the bottom of the pay card and corrected from time to time as may be necessary.

Pay cards are kept in loose-leaf binders and are arranged alphabetically in the binders without regard to rank, a separate binder being provided for each company and detachment.

ENTRIES

The following data is recorded on the pay cards:

A. Absences.

Each absence affecting a soldier's pay status reported on the morning report is noted under "Forfeitures, deductions and partial payments" on the pay card of the absentee by the personnel officer. The morning report is initialed by the personnel officer immediately above the name of the absentee in the remarks on the morning report, to indicate that the proper notation has been made on the pay card.

B. Appointments, Promotions, Ratings, etc.

All orders announcing appointments, promotions, reductions, ratings, extra duty details, etc., and other communications affecting in any way the pay of enlisted men pass through the personnel officer, who writes or stamps on the copy furnished to the company or detachment commander concerned the words "Entered on Pay Card," adding his initials. Information concerning appointments by an organization commander, such as appointment of first sergeant, bugler, mechanic, etc., that change the pay status of enlisted men is taken by the personnel officer from copies of company orders submitted with the morning report, the personnel officer affixing his initials on the morning report above the name of each man concerned, to indicate to the organization commander that the changes have been noted on the pay cards. In entering change of status of enlisted men on morning reports the surnames only are given, except in cases where there are two or more men of the same name in the organization, when the surnames will be followed by the initials, i.e., "Sgt. Smith, J. M., appt. 1st Sgt."

C. Allotments.

The duplicate applications for allotments, all classes, and for insurance are sent to the regimental or other headquarters with the morning report on the day following the mailing of the original applications to the department or division commander. The personnel officer enters the amounts of the allotments and insurance premiums on the pay cards of the men and returns the duplicate applications to the organization commander with the morning report, after writing or stamping on the application the words: "Entered on Pay Card," followed by his initials.

When communications announcing action by the Bureau of War Risk Insurance on an application for the discontinuance of or change in an allotment, or when an acknowledgment from the Depot Quartermaster, Washington, D. C., that an allotment has been discontinued prior to the expiration of the allotment period is received, or when a Class E allotment has run for the full period for which granted, the company or detachment commander sends the communication or acknowledgment, or duplicate allotment (Q.M.C. Form 38), as the case may be, to the Personnel Officer with the morning report. The personnel officer enters the action taken on the pay card of the soldier and returns the communication, acknowledgment or duplicate allotment form to the organization commander after writing or stamping thereon the words "Entered on pay card," followed by his initials.

D. *Courts-Martial Proceedings.*

In case of trial by summary court-martial the copy of the charge sheet completed as a copy of the summary court record for the company or detachment commander passes through the personnel officer, who, after entering on the pay card the amount of any forfeiture, writes or stamps on the charge sheet the words "Entered on pay card," followed by his initials.

All general and special courts-martial orders pass to the organization commander through the personnel officer, who, after entering on the pay card the amounts of all forfeitures, if any, writes or stamps on the orders the words "Entered on pay card," followed by his initials.

E. *Damage to or Loss of Public Property.*

When charges are to be entered on the pay rolls against enlisted men for public property lost or damaged through the neglect or carelessness (Par 686 A.R.), a statement of charges on Form No. 602 A.G.O. is opened by the organization commander on the day that the first charge for the month is made and closed on the last day of the month. The statement of charges containing the entries for the day are submitted with the morning report to the personnel officer, who, after entering the data on appropriate pay cards, affixes his initials opposite the name of each man on the statement of charges and returns the statement of charges with the morning report to the company or detachment commander. This procedure is followed for each charge during the month. Pending revision of the form for statement of charges, a column is ruled in the space provided for "Cause of charge" and headed "Initials of personnel officer."

Charges for clothing and articles of the individual mess equipment found to be missing when a soldier is discharged, dies, deserts, or is otherwise separated from the service are not entered on statement of charges. In such case the organization commander prepares a certificate enumerating the articles found to be missing, giving prices thereof, and submits the certificate to the personnel officer with the morning report. The latter enters the total amount on the pay card of the soldier, writes or stamps on the certificate "Entered on Pay Card," followed by his initials, and returns the certificate to the organization commander with the morning report, for file with the individual equipment record of the soldier.

F. *Stoppages, Charges or other Changes in Soldier's Pay Status.*

All reports of stoppages, charges, or changes in soldier's pay status not enumerated above are forwarded to the personnel officer, who writes or stamps on such report the words "Entered on Pay Card," followed by his initials, and

returns these reports to the organization commander, or to the office from which received.

INDORSEMENT ON PAY CARD IN CASE OF TRANSFER OR DETACHMENT

When a soldier is transferred or detached the personnel officer fills out and signs one of the indorsements on his pay card, showing date of indorsement, date to which he was last paid in full, and the name, rank and organization of the officer by whom paid. If the soldier has not been paid in full since he joined the company or detachment from which he is to be transferred or detached, the personnel officer will not fill out a new indorsement, but affixes his signature, preceded by the date, in the space between the signature to the last indorsement and the date line for the succeeding indorsement. If the soldier has not been paid in full since the date of enlistment or since entry in the active service in the case of a reservist or retired soldier called into active service, the personnel officer affixes his signature, preceded by the date, in the space immediately above the date line for the first indorsement.

Partial payments are not shown in indorsements on pay cards, such payments with dates and amounts being entered under "Forfeitures, deductions, and partial payments."

TRANSMISSION OF PAY CARD TO NEW PERSONNEL OFFICER

The pay card indorsed as provided in the preceding paragraph is delivered by the personnel officer to the organization commander who copies on Form No. 29a A.G.O. (Extract from service record) so much of the data on the pay card as may be necessary for the preparation of his indorsement on the soldier's service record. If the soldier is a member of a party to be transferred or detached, his pay card is turned over by the organization commander to the officer or non-commissioned officer in command of the party. If he is to travel alone, or if no officer or non-commissioned officer is placed in command of his party, the card inclosed in a sealed envelope is turned over to the soldier. Upon arrival of the party or the individual soldier at the new station the pay card is delivered to the new organization commander, who, when practicable, compares the entries thereon with the service record and transmits the pay card to the new personnel officer.

If through any reason a soldier is separated from his command without his pay card, as for example, should he be left sick in a hospital, public or private, his pay card, indorsed as provided in the preceding paragraph is forwarded directly to him without delay by his company or detachment commander, who so informs the officer to whom he forwards the soldier's service record.

DISPOSITION OF PAY CARD IN CASE OF DISCHARGE, ETC.

When a soldier is discharged, dies, or is otherwise separated from the service, the personnel officer fills out the next indorsement on the pay card and delivers the card to the company or detachment commander, who after preparing final statements, forwards the card to the Adjutant General of the Army with the soldier's service record. (Previous to July 1st, 1918, this card was filed with the soldier's service record in the company or detachment.) When a soldier is furloughed to the Reserve, or relieved from active service in case of reservist, his pay card, properly indorsed, is forwarded by the company or detachment commander to the officer charged with keeping reservist records.

PROCEDURE IN CASE OF LOSS OF PAY CARD

When a pay card is lost, misplaced, or destroyed, a temporary pay card is opened by the personnel officer from data obtained from the service record and other available records. The personnel officer opening the card writes the word "Temporary" above the words "Pay Card" in the caption, and will make the following certificate in the space provided for the first indorsement: "I certify that the entries on this card are correct."

Upon recovery of the original pay card, it is brought up to date from data obtained from the temporary card and the latter is cancelled and filed with the records of the company or detachment to which the soldier belongs.

PROCEDURE FOR COMPANIES AND BATTALIONS DETACHED

When a company is detached from its battalion or other similar unit the personnel officer turns over the pay cards for the men of the company and the retained pay roll for the preceding month, or last month for which the company was paid, to the company commander or to a lieutenant designated by the company commander as personnel officer. When a battalion is separated from its regiment, the regimental personnel officer turns over to the officer designated by the battalion commander as battalion personnel officer the pay cards of all men of the battalion and the retained pay rolls for the preceding month, or the last month for which the companies of the battalion were paid. When a detached battalion rejoins the battalion or regiment the pay cards and all retained pay rolls are turned in to the battalion or regimental personnel officer. Similar procedure is followed when a company or battalion not forming a part of a separate battalion or other separate unit is detached from or joins a command, post, camp, or other station.

PARTIAL PAYMENTS

Advance or partial payments may be made to soldiers, under orders to be transferred or detached or to change station, when such payments are necessary to enable them to settle their post exchange, post laundry, and other accounts before departure for their new station. In the American Expeditionary Forces partial payments may be made for other purposes when so ordered by the regimental, separate battalion, or other similar unit commander, or by a higher authority.

No partial payment shall exceed the proportionate part of the unobligated monthly pay which has accrued on the date that the soldier is paid. To determine the unobligated monthly pay all allotments, forfeitures, and other charges against the soldier are deducted from his total monthly pay, including additional pay for marksmanship, gunner qualification, rating, etc. For example: If a soldier's monthly pay is \$35.00; his allotment \$15.00; insurance premium \$5.00; and forfeiture \$5.00, his unobligated pay would be \$10.00. If the partial payment is made on the 10th day of the month, he may be paid not exceeding ten-thirtieths of this amount, or \$3.33. As a rule, partial payments should be in even dollars. In the example stated the soldier should, therefore, be paid \$3.00, \$2.00, or \$1.00, as may be deemed advisable.

The amount and date of each partial payment is entered on the soldier's pay card under "Forfeitures, deductions and partial payments. Partial payments in individual cases are made on War Department Form No. 369. In case of a detachment of ten or more men a pay roll for the detachment is prepared by the personnel officer in the following manner: A regular pay roll is used

but the only data entered thereon is names, grades, dates of enlistment, enlistment period, Army serial number, the amount of partial payment in the column headed "Balance Paid" and the signature of the soldier. In such cases the personnel officer adds the following certificate in addition to his regular certificate as to the correctness of the entries: "The amounts set opposite the name of each soldier on this roll have been charged against him on his pay card."

PAYMENTS TO SOLDIERS SEPARATED FROM SERVICE RECORDS

Enlisted men while changing station or on detached service and separated from their service records on or after the last day of a month for which pay is due may be paid from data furnished by their pay cards by the nearest disbursing quartermaster on W. D. Form No. 369, or in case of a detachment of ten or more men on a detachment pay roll. The quartermaster making payments in such cases fills out and signs the next indorsement on the pay card of each soldier and reports the fact, date and amount of such payments by letter to the officers holding the service records of the men to whom the service records were forwarded, who delivers the letter with the pay cards to the personnel officer upon arrival of the men. This privilege is only permitted to be exercised when soldiers are unable to secure their pay in the regular manner.

Special emphasis is given to this phase of the pay of soldiers in a letter of June 12, 1918, from the Adjutant General of the Army by order of the Secretary of War, to all Department, Division and Port of Embarkation Commanders, and commanders of all excepted places, on the subject of Temporary Service Record and Pay Card.

The letter calls attention to the fact that soldiers in hospitals, invalided home, on detached duty, transferred or on furlough, are not paid as regularly and promptly as desired.

It calls attention to the fact that such delay has been traced to soldiers being separated from their service records. Particular attention is called to Bulletin No. 8 W. D. 1918 and Special Regulations No. 58-A 1918 as a cure for this evil.

W. D. Bulletin No. 8, 1918, provides for the execution of a temporary or emergency service record when the soldier is separated from his original service record. This temporary service record is prepared at the soldier's new station, or at hospital (if wounded or sick) by the commanding officer thereat from any available data on hand, and pay roll may be prepared and certified accordingly.

The function of Special Regulations No. 58-A 1918 noted in this letter is that of providing pay cards. The main point in the letter is that the pay card should at all times carry sufficient data for the preparation of Form 369 if individually paid, or Form 366A W. D. if the number of men to be paid exceeds 10.

Its concluding sentence is imperative. Under no circumstances shall a soldier go without pay or pay be withheld because of missing service record.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE IV

MILITARY CORRESPONDENCE, MILITARY CHANNELS, CORRESPONDENCE BOOK,
DOCUMENT FILE, USE OF COMPANY RECORD AND REPORTS

MILITARY CORRESPONDENCE

OUTLINE

1. Classification of Correspondence.
2. Military Channels.
3. Form of Military Letters.
4. Indorsements.
5. Enclosures.
6. Folding.
7. Carbon Copies.
8. Style and Character of Military Letters.
9. Penalty Envelopes.
10. The Memorandum.
11. The Telegram.
12. General Points to be Observed in Military Correspondence.
13. Blank Forms.

A considerable part of the work of the clerk in the Motor Transport Corps is the preparation and handling of various kinds of correspondence. Complete and very definite rules are laid down relative to the form, style and methods of handling military correspondence, differing in many respects from those prevailing in ordinary commercial correspondence, and it is therefore essential to have an exact understanding of these rules.

1. *Classification of Correspondence.*

Correspondence is divided primarily into five classes: *General*, *Special*, *Telegraphic*, *Confidential*, and *Secret*.

(a) *General Correspondence* is that arising out of the routine operations of a government department or other division of the military service. It consists of notifications of orders, regulations, treatises on general subjects connected with the service, maps, documents, drawings, etc. Because of its widespread circulation such correspondence is usually printed in some form or other, and the average clerk will have little to do with its preparation.

(b) *Special Correspondence* is any official correspondence between individuals or between departments, and individuals in their official capacity. It is the type of correspondence with which the clerk must be familiar. *Special*

correspondence may be further subdivided into *formal* correspondence, consisting primarily of *letters* prepared according to the rules for military letters; and *informal* correspondence, such as memoranda, on matters of lesser importance.

(c) *Telegraphic Correspondence*, as its name implies, consists solely of telegrams (either night or day) and is not correspondence in the strict sense of the word. In general, telegrams are authorized for use only in cases of emergency.

(d) *Confidential Correspondence* is any correspondence which can not be made a matter of general knowledge but restricted to a more or less degree to certain individuals or groups of persons within this service. Such correspondence may be subdivided into three general classes indicated by the terms "Secret," "Confidential," and "For Official Use Only." Any correspondence, document, or map marked "Secret" is for the personal information of the individual to whom it is officially entrusted and all those officers under him whose duties it affects.

(e) 1. A document or map marked "Secret" is for the personal information of the individual to whom it is officially entrusted, and of those officers under him whose duties it affects. The officer to whom it is entrusted is personally responsible for its safe custody, and that its contents are disclosed to those officers mentioned above, and to them only. The existence of such a document or map will not be disclosed by the officer to whom it is entrusted nor by his officers, without the sanction of superior military authority. No document or map marked "Secret" will be even taken into the front line trenches in the theatre of war. A document or map marked "Secret" even though it may bear other classifying marks, such as "Confidential" or "For official use only" will nevertheless be regarded as "Secret" within the meaning of this paragraph.

2. A document or map marked "Confidential" is of less secret a nature than one marked "Secret" but its contents will be disclosed only to persons known to be authorized to receive them or when it is obviously in the interest of the public service that they receive them.

3. The information contained in a document or map marked "*For official use only*" will NOT be communicated to the public or to the press, but may be communicated to any person known to be in the service of the United States, simply by virtue of his official position.

4. Documents and maps classed as "Secret" or "Confidential" will NOT be referred to in any catalogue or publication which is not itself a document marked "Secret" or "Confidential" as the case may be. An officer or soldier who communicates information contained in a document or map marked "Secret" or "Confidential" or "For official use" will, at the same time, inform the person or persons to whom he communicates the information that it is "Secret" or "Confidential" or "For official use only," as the case may be. The only legitimate use an officer or soldier may make of documents or information of which he becomes possessed in his official capacity is for the furtherance of the public service in the performance of his duty. Publishing official documents or information, or using them for personal controversy or for any private purpose without due authority will be treated as a breach under the Articles of War, or under Section 1, Title 1, of the Espionage Act approved June 15, 1917. In order to reduce the possibility of confidential communications falling into the hands of persons other than those for whom they are intended, they are enclosed in an inner and outer cover. The inner envelope or wrapper is addressed in the usual way but very plainly marked "Confidential."

dential," this is enclosed in another sealed envelope or wrapper addressed without notation of any kind as to the confidential nature of its contents.

2. *Military Channels.*

Unlike the business letter of the commercial world, the military letter does not always proceed directly from the writer to the one to whom it is addressed. Communications, whether from a superior to a subordinate, or vice-versa, must pass through the intermediate commanders. This is known in the Army as "Military Channels."

In the service it is customary for official communications to be addressed to the person or department for whom intended followed by the phrase "Through Military Channels" or "Through Channels" entered (between the name of the person addressed and the subject as will be seen hereinafter). Letters of this character are then passed to the intermediate commander of the writer who forwards it by indorsement to the next intermediate commander, and so on until it reaches the proper destination.

Letters from enlisted men of the company intended for the commanding officer of the Post, for example, are addressed to him "Through Military Channels." Such letters are delivered to the company commander, who, if he approves, forwards them by indorsement to the next superior officer (in this case the regimental commander) who takes similar action indorsing the letter to the Post Commander. Similarly letters from a company commander intended for any superior officer or department must pass through the hands of all the intervening officers before reaching their official destination.

Official communications from officers and enlisted men of the Army intended for the Secretary of War or any Bureau or office of the War Department are addressed to the Adjutant General of the Army who transmits same to the proper department for action. Letters from an officer of one of the special staff corps to his bureau chief, regarding which the intermediate line officers have no interest, are not required to go through military channels to the A.G.O., but may be sent directly to the bureau chief, e.g., if the Div. Q.M. of an infantry division desires to make a recommendation of interest to and affecting only the Q.M.C. he need not send it through the division commander to the A.G.O., but may send it direct. If a subordinate Q.M. officer within the division desired to send a letter of that sort, it would first have to go through channels to the Div. Q.M. and then up. However, if a letter concerned the division, as, for instance, if it concerned the state of Q.M. supplies or funds, etc., it would have to go through regular channels and be sent up by the Division Commander.

Correspondence in Field Service normally goes through the following military channels in the order intended: Company Headquarters, Regimental Headquarters, Divisional Headquarters, and Commander in Chief of the Field Forces.

3. *Form of Military Letters.*

(A) *Divisions:*

The Military Letter is divided into three parts, namely:

1. *The Brief* includes the heading, the number of the letter, the place or designation of the writer.

(a) *The Heading* consists of the place and date and is placed either to the right of the sheet about an inch from the top occupying two or three lines as necessary or the place may be written or printed in the center of the sheet

at the top and the date only written to the right. Expressions of locality must be definite, including the name of the place as "Camp Meigs" followed by the Post Office address as "Washington, D. C." When the letter is written from the office or headquarters of a department, organization or station, it is customary to indicate this in the heading preceding the location as:

Headquarters 19th Division,
Camp Zachary B. Taylor,
Louisville, Kentucky.

In the upper left hand corner of the brief, below the date line is written the file classification number. This number is used for identification in filing purposes.

Two spaces below the file number and an inch or an inch and a quarter from the left hand side is the word "From" with a colon, followed by the official designation of the writer, for example, "The Camp Quartermaster" or "Commanding Officer, Company L, 334th Infantry. In the absence of any official designation the name of the writer with his rank and regiment, corps or department is used instead. Two spaces below is the word "To" with a colon, followed by the designation of the person addressed as described above. Next comes the word "Subject" with a colon, followed by a statement of the subject of the letter in as few words as possible not to exceed ten.

The words "From," "To" and "Subject" should begin on the same vertical line. Not less than four line spaces on the typewriter will separate the date line and the "From," "To" and "Subject." A double line space will separate the "Subject" line from the first line of the body of the letter.

OFFICIAL ADDRESSES

The staff officers of a Post Commander are addressed as follows: The Adjutant, The Camp Quartermaster, The Surgeon, and so on. Always address the title or office of the person addressed. In addressing commanders of companies within a camp as at Camp Meigs, either the form "The Commanding Officer" or "Commanding Officer" may be used; but it is the custom to use in such cases, "Commanding Officer, Headquarters Detachment, Camp Meigs, etc." Otherwise in case the address should be transferred, the letter when addressed to him personally would follow him to France if necessary, whereas the subject matter of the communication might directly concern the department rather than the individual. Instructions have been given previously covering a communication to one who has no official title.

The Brief occupies the upper third of letter size paper and the upper fourth of legal-size paper and *nothing but the brief* may be written in that portion of the sheet.

2. *The Body* of the letter follows at least two spaces below the subject, care being taken to start it below the upper fold of the letter. When typewritten, it is single spaced with a double space between paragraphs. The body of the letter is written with the same margin as the "From," "To" and subject of the brief, paragraphs being indented about ten spaces or an inch. When there are two or more paragraphs, each paragraph is numbered; no number is required when there is only one paragraph. The first paragraph should always contain the request or recommendation to be made, followed by the reasons, etc., in the subsequent paragraphs where necessary.

3. *The Signature* of official communications must be signed with a pen and not by fac-simile. At least four spaces are left between the last line of the body of the letter and the first line of the signature. The name of the writer,

under recent regulations must be typewritten on the first line below the blank line left for the written signature. This is followed by the rank, regiment, corps or department of the writer where his official designation only has been given in brief. If this information is contained in the brief, however, it is not repeated in the signature.

4. *Indorsements.* It is customary in military correspondence to answer letters or forward them on through military channels by means of indorsements. The first indorsement follows two spaces immediately after the signature of the writer of the letter and succeeding indorsements follow in order with two spaces between the indorsement to be written and the signature of the preceding indorsement with an interval of about a half inch between. Additional sheets may be used where the number is so great as to use up the space left on the original communication. Each indorsement is preceded by its serial number (1st. Ind., 2d. Ind., etc.), written in the center of the page, two spaces below, and beginning at the left-hand margin is written the name and rank, title, reg. or corps of the party writing the indorsement followed by the place and date; then two dashes are made followed by the word "To." Next the word "To" followed by the official designation of the person or office addressed. Any recommendation as to approval or disapproval or additional information is written two spaces below followed by the signature of the writer with his rank (except that routine indorsements covering the passage of correspondence through military channels may be merely initialed). The body of the indorsements is single-spaced with double space between paragraphs and when there are two or more paragraphs, these are numbered consecutively. The writing width of the indorsements is the same as that of the letter, and the indorsements are prepared with the same number of copies as military letters and the copies distributed in the same manner.

(Note: In making indorsements be sure the carbon copy to be retained for the office record contains a complete record of the preceding indorsements and the letter indorsed).

5. *Inclosures.* Whenever supplementary records, reports, letters, etc., accompany military correspondence, such inclosures must be numbered and given proper office marks. The number of inclosures to the original communication is noted on the face of the letter to the left, opposite the signature. When inclosures are added at time indorsements are made a notation as to their number is added below the indorsement in question as "one inclosure added," and below this the total number of inclosures, including the one added. In case inclosures are withdrawn notation is made, i.e., "one inclosure withdrawn, total two inclosures." Similar notation as to the inclosures added is made on the back of the lower fold of the first sheet of the original communication, with the addition of the number of indorsement by which added, as "one incl. 5th ind."

Inclosures to indorsements are numbered in the same series as those to the original paper and the number of the indorsement to which they belong is added below. If few in number and not bulky, inclosures may be kept inside the original paper; otherwise they will be folded together in a wrapper marked "Inclosures." The entry of serial numbers on inclosure and notations on papers to show the presence of inclosures to an original communication or to show inclosures added or withdrawn will be made in the office in which the inclosures originate or are added or withdrawn. ("Moss Army Paper Work, Para. 6). The total number of inclosures accompanying a paper will be noted at the foot of each indorsement thereon.

6. *Folding.* All letter paper is folded in three and foolscap in four equal folds parallel with the writing. The top fold containing the brief is folded

toward the back of the letter and the lower fold over the face of the letter. Upon this lower fold is placed the office mark. This is a stamp bearing the number which serves to identify and coordinate all communications received in an office. The received and received back stamps are placed immediately below the body of the letter. In three-fold letters both the brief and the office mark are on the outside, rendering their identification easy at a glance. In three-fold letters of more than one sheet the two lower folds of all sheets except the first are placed between the first and second folds of the first sheet. In four-fold letters, whether of one sheet or more than one, both the brief and office mark can not be exposed at the same time. Either the brief or the office mark is covered by the other. It is necessary to choose which is most necessary for the identification of the letter and expose it.

7. *Carbon Copies.* Except in the case of letters of transmittal, periodical reports and similar communications of minor importance, all letters and indorsements that are typewritten are made with at least two carbon copies. One copy (or as many more as are desired) is retained for the files of the writer, and one is forwarded with the original communication. This forwarded copy is not regarded or marked as an enclosure. This copy is retained by the first office receiving the communication which requires a complete copy thereof for its records. The original is forwarded on through military channels by means of indorsements added to it; each office making an indorsement to the original communication makes at least two copies thereof retaining one and sending the other with the communication to be retained by the next receiving office.

Whenever a letter is received that is to be indorsed or otherwise forwarded, and consequently does not remain in the files, which is of sufficient importance to be made part of the records of the receiving office, the clerk must make a copy of it, as the original communication is not retained but made the basis of further handling of the communication and eventually returned to the original writer.

8. *Style and Character of Military Letter.*

1. The Military Letter should refer on one subject only. This is especially important because correspondence is filed within the War Department according to subject.

2. Only one side of the paper is used. Margins of an inch or an inch and a quarter should be left on either side. No colored inks are used. Particular attention should be paid to the neatness of the letter.

3. Letters should be concise and as brief as possible. Statements should be direct and to the point.

4. Ceremonial expressions and forms of address of all kinds are omitted. Words like "I have the honor to request" or "Thanking you very kindly" and all forms of salutation and complimentary closing are disregarded. This does not mean that the letter should not be courteous in tone, but there should be no unnecessary language.

5. Wherever possible military letters should be written in the third person.

6. Titles are not as a rule abbreviated, although when exceptionally long they may be. A list of standard abbreviations is used in Army paper work and will be found in M.Q.M.C. Vol. 2, Appendix 27, Paragraph 38. These abbreviations are intended primarily for the use in preparation of pay rolls when the knowledge of them is of value in connection with correspondence.

7. Letters from an officer or enlisted man to any superior officer should "Request" rather than "demand" or "direct."

8. The first paragraph of a letter should make reference to any previous correspondence where necessary, and state the specific request or recommendation to be made followed by any modifying statements or explanations.

9. *Penalty Envelopes.*

Official communications and other mailable matter relating exclusively to the public business are transmitted through the mails free of postage if covered by the "Penalty Envelopes." Letters and publications are sent under government franks, which have stated on their face the words "Official Business" and also the words "Penalty for private use \$300." This last expression gives the envelope the official name, penalty envelope.

Information which is intended to be used in the performance of official duty only is official information. That which is to be used for the furtherance of private interest or business, even though called for by a public officer, is private information. The official or penalty envelopes may be used to give or obtain the former but not the later.

When an official writes to a private party on official business, he may enclose with his letter an official penalty envelope properly addressed to himself, to cover the reply, provided the reply is important from the standpoint of the government A.R. 837. But where the reply is for the benefit of the other party, he is not entitled to use the penalty envelope in sending it. Thus, it has been held that a commercial firm was not entitled to use penalty envelopes for the submission of vouchers to the Q.M. for payment of accounts of the firm.

The penalty envelope is not used for foreign correspondence.

10. *The Memorandum.*

When communications are of a local nature or not important enough to require the formal letter, an informal type called the *Memorandum* is used, an example of which is shown as follows:

HEADQUARTERS, 2nd BATTALION,
301st INFANTRY,
CAMP DEVENS, MASS.

July 7, 1918.

Memorandum: Commanding Officer, Company B.

1. Report will be submitted to these headquarters by 9:00 A.M., July 8, 1918, of all men in your organization whose service records do not show typhoid inoculation to have been completed.

By order of Major Brown.

Horace W. Green,
1st Lieut. Infantry,
Adjutant.

The regulations regarding military letters do not apply to memoranda. Only one copy is forwarded and no record need be kept except for the convenience of the writer. In actual practice, this type of communication is the one most frequently used. It is not the practice to add indorsements to memoranda, but rather where the occasion demands, make replies in the form of new memoranda.

LETTERS TO PERSONS OUTSIDE OF THE SERVICE

Letters written to civilians or commercial firms outside of the service follow the ordinary business form but with as little ceremonial language as is consistent with courtesy.

11. *Telegrams.*

Official Telegrams are sent on Form 406 Q.M.C. (Procure and Refer to form.) In case a form is not available, use an ordinary commercial blank,

indorsing thereon, over your own signature. "This telegram is on official business, and necessary for the public service," and also mark it "Government Paid." (Cir. 17, Q.M.G.O. 1916). Never mark an official telegram "Government Collect." Accounts for telegrams on military business prepared in the prescribed forms in the name of the telegraph company rendering the service and accompanied by the original telegrams, will be paid by the Depot Quartermaster, Washington.

When the telegrams are sent "Collect" by private individuals, the nature of the telegrams should govern the action of the disbursing Quartermaster. If strictly Government business, payment will be made by the designated disbursing officer on the "impression copy" made by the receiving operator. This impression copy must show the full check "Collect," the date and place of origin, the place of destination, operator's indication of transmission, time filed, and time sent. It is practicable the officer receiving such a "Collect" telegram will place and sign on the impression copy the same certification that is on Q.M.C. Form No. 406, delivering it to the telegraph company's representative.

The telegraph and cable will be used in case of urgent and imperative necessity in which the delay consequent upon transmission by mail would be prejudicial to the public service (A.R. 1184). Day telegrams will not be sent when night telegrams would serve the purpose, consideration being given to the difference between eastern time and that of the zone to which the message is sent. Except in case of great urgency, night telegrams will not be sent when the delivery can be made by mail the following morning. Night telegrams will be plainly indicated by the words "Night Telegram" stamped thereon. (A.R. 1184). Urgent telegrams should be marked "Day Service—Urgent." (Cir. 17, Q.M.G.O. 1916).

Whenever practicable, the consolidation into one message of several telegrams to be sent to a single officer in the course of a day's business should be effected. (A.R. 1184).

Whenever special delivery is necessary to expedite the delivery of an official telegram, or where the place of delivery is located beyond the established free delivery limits, the office filing the telegram for transmission should mark it "Special Delivery Charges Paid." These charges, which should be included in the bill of the telegraph company will be settled the same as regular charges. If such charges would be excessive, mark the telegram "By mail from....." indicating the name of the telegraph office from which the telegram should be mailed.

Numerals will be written out in all telegrams. Example:

"Retel September *twenty-ninth* comma appropriation for *one thousand three hundred fifty* dollars approved."

The expression "Retel" followed by the date on which the telegram was sent is used when referring to a telegram being answered.

All telegrams will be carefully scrutinized to see that superfluous words are omitted, addresses condensed, and the official title of the sender omitted or reduced to the minimum, thus bringing the message, as far as practicable, within the limit of twenty words. Example:

"Retel of this date comma arrangements *will be made for you to report immediately in order that your pay status may be determined.*"

In the above case, the words italicized should be omitted.

All official telegrams should be signed with the name of the Department Head; for instance in the Surgeon General's office, telegrams of an official nature are signed "Gorgas." Official telegrams within Camp Meigs are signed by the name of the Commanding Officer of the camp, per the name of the

Company Commander, or other subordinate officer; for instance "Gienty per Smith."

In preparing telegrams where a reply is indicated, to insure facility in despatch of replies, a sentence, in substance, as follows, will be inserted in the body of the telegram—"Wire attention (name of officer interested)."

All telegrams of an official nature will be prepared with two carbon copies, one yellow tissue sheet for the files of the office, and one white tissue, to be marked "Confirmation" and mailed to the addressee. When a telegram is of such a nature as to be urgent although not strictly confidential it may be phoned to the telegraph company. In such cases the original is mailed to the telegraph company and in the lower left hand corner is noted the time sent and the initials of the party who phoned the telegram. Example:

"Official
(Confirmation Phoned 9 A.M.)
HEJ 6-30-18."

Punctuation points are charged for at word rates. They should not be put in a telegram unless they are necessary to make sense, and in that case should be spelled out. Compound words count as one word.

The last name of the officer addressed, or his title, and the last name of the sender are generally sufficient; for example, in case of officer addressed: "Colonel Harris, Twenty three West Fiftieth Street, New York City."

Telegrams to the Adjutant General of the Army should be addressed "Adjutant General, Washington, D. C. Official telegrams sent from the Office, Chief, Motor Transport Corps, are signed "Drake Motors" followed by the name of the officer sending the telegram, e.g., "Drake Motors Andrews" depending on the branch of the office sending the telegram.

12. *General Points to be Observed in Military Correspondence.*

The clerk will have occasion to handle from time to time various kinds of general communications from the Commanding Officer of the Camp or Post and other superiors. These are in the form of general orders and bulletins usually issued by the Adjutant General for the Army as a whole, and circulars and orders by the Director, Motor Transport Corps covering the Motor Transport Corps only. Such communications are merely filed in a convenient manner for ready reference as they apply to the ordinary conduct of business within the service. In addition to this, special orders, bulletins, circulars, etc., are issued by the Commanding Officer of the camp or station for the guidance of organizations and individuals within the jurisdiction of the Commanding Officer. These are filed separately in the same way as the general communications described above.

13. *Blank Forms.*

Still another type of correspondence used in the Army may be termed "canned" correspondence. These are the standard blank forms authorized by the Secretary of War to cover the ordinary routine of government work and take the place of a large amount of correspondence that would otherwise be necessary. In addition to the general forms provided for use for the Army as a whole there are a number of special forms provided by the various corps and departments of the Army for use only within their jurisdiction. All of the standard forms, however, have the same authority as Army regulations and the directions accompanying them are to be followed rigidly.

It should be kept in mind that a knowledge of the proper use of the forms provided will eliminate a great deal of unnecessary correspondence and

greatly simplify the work of the clerk. Instructions on these forms should be carefully studied and the students should be able to fill them out correctly and completely.

CORRESPONDENCE BOOK AND DOCUMENT FILE AS USED IN A COMPANY OFFICE

- Method of keeping record of correspondence and returns in company office.
- Uses or Correspondence Book.
- Authorized by A.R. Par.-280.
- How long retained.
- How obtained.
- Relation Between Correspondence Book and Document File.

DOCUMENT FILE

- What it consists of.
- How uted.
- A.R. concerning Document File.

A company keeps a record of its correspondence in what is known as the Correspondence Book, supplemented by the Document File.

The Correspondence Book is a blank book, four inches wide, 8½ inches long, and about an inch thick, contains an index, and is furnished by the A.G.O. on request; or it may be any blank book approximately that size and containing an index. The blank pages are for entries regarding correspondence, the index for the purpose of readily finding any entry.

Figures 1 and 2 show samples pages of the Correspondence Book.

Anderson, Joseph	2033	A
2034, 2116, 2117		
Andrews, James	2035	
2036, 2230, 2231		
Ammonia Solution	2149	
Articles of War	2345	
2350, 2400, 2451		

FIG. 1

(Index)

	197	A
2031	July 3/18	
Muster Roll forwarded through		
Mustering Officer.		
2032-Doc.		
2033-Doc.		
2034	July 6/18	
Efficiency report of Lieut. Miller		
forwarded through Post Com-		
mander.		
2035	July 12/18	
Rec'd. July 12/18 from C. O.		
Madison Bks. N. Y. application		
of Mech. James Andrews, Co.		
"A" 1st Inf., requesting transfer		
to Co. "B" 2nd Inf.		
1 Incl. to C. O. Madison Bks.		
N. Y. July 12/18 Doc.		

FIG. 2

(Entries)

The nature and extent of the entries in the correspondence book depend primarily on whether or not the office has for file in the document file a carbon or other copy of the letter, indorsement or other item of correspondence referred to. If such letter, indorsement, etc., is completely represented in the document file by a copy, nothing but the file number followed by the word Doc. (e.g., 2033 Doc.) is entered in the correspondence book.

If, however, a letter, etc., is not represented in the document file by a copy, then a brief of same, with notation of action taken thereon, is entered in the correspondence book. Such a brief consists of:

1. The serial number of the item in the Correspondence Book.
2. The date of the communication or the indorsement, and the date of receipt.
3. The name of the writer.
4. A very brief synopsis of the subject.
5. Notation of numbers of inclosures, if any. (State if any inclosures are added or withdrawn. If inclosures are important make a copy of synopsis.)
6. Action taken. (Disposition of paper and date.)

"Remember that indorsements are not entered in the correspondence book. When made of record at all, copies of them are filed in the document files." (Moss, Army Paperwork.)

The document file also contains copies of all letters, indorsements or telegrams originating in the office; but in handling incoming papers, especially indorsements, common sense must be used in choosing what shall be filed and what briefed in the correspondence book. An office should not have on its records any facts which do not concern that particular office.

Each item in the correspondence book is numbered from 1 forward continuously and without break for any new year.

The papers that are filed in the document file and the entries that are made in the index are numbered to correspond with the numbers of the items in the correspondence book, the papers in the document file being filed serially.

"Each item entered in the correspondence book is indexed under its subject, and when necessary under the name of the writer of the communication and the name of the persons mentioned therein. (One entry of a name or a subject in the index is as a rule, sufficient.) The numbers of any other items about that subject are placed after the original entry in the index. (See illustration, Fig. 1.) A space of at least three lines should be left below each original entry in the correspondence book for use in continuing the record, if necessary."

No communication exhibiting the notation of a previous entry should be again entered in the same correspondence book, unless for special reasons. If a communication that has already been entered is returned, the necessary data are added to the previous entry. However, should it be necessary to enter the same communication a second time, head the entry "Continued from page —" and add after the original entry "Continued on page—." Since almost every company office has the use of a typewriter, a carbon copy of practically all correspondence passing through the office is retained in the files. Therefore, for the most part the entries in the correspondence book show only the document numbers.

THE DOCUMENT FILE

The need and purpose of an adequate filing system is to provide: first, a place for the safe keeping of papers, cards, documents or records of any kind;

second, a method of classification that insures the filing in the same place of all papers on the same subject and the finding of papers quickly when needed.

The correspondence book is supplemented by the *Document File*. The papers of that file will be numbered to correspond with the numbers of the items and of the index entries and will be filed according to their serial numbers. The file will contain the original documents or communications when these are retained, and carbon, letter press, or other legible copies of all letters, indorsements, or telegrams sent with regard to the same. The file will also contain similar copies of all letters, indorsements or telegrams originating in the administrative unit or office. When more than one paper pertaining to the same item is placed on the file, the papers will be placed in an envelope, if practicable, and the number of the item will be noted thereon. Papers differently numbered, but on a related matter, may also be kept together when desired, but if so kept, a reference slip must be inserted to account for the paper absent from its serial place.

No record will be made beyond the mere notation of the fact of origin or receipt and disposition in respect to the following:

1. All papers not pertaining to the business of the receiving office. These should be transmitted forthwith to the proper place for action.
2. Accounts current, vouchers, returns of personnel and of stores and other property, inventory and inspection reports, and requisitions.
3. Mere letters of transmittal. Such letters when received will be destroyed forthwith.
4. Request for and acknowledgment of receipts of publications and blanks.
5. All other communications that have no permanent value and that are finally disposed of by answers thereto.
6. The serial numbers in the "Document File" will consequently not be complete, but whenever a paper is filed therein, abbreviation "Doc." will be placed after the proper entry in the correspondence book in order to indicate that the paper itself, as well as any record pertaining to it, will be found in the "Document File."

The following named books of record, reports, and papers will be kept in each company as ordered by paragraph 280 A.R.

"A correspondence book, a sick report, a morning report, and in companies supplied with public animals, a file of descriptive cards of public animals, all to be furnished by the Adjutant General's Department; also a company council book, a record of punishment awarded by the company commander under the provisions of paragraph 953 to be furnished by the Quartermaster Corps.

"There will also be kept, on blanks supplied by the Adjutant General's Department, a complete record, description, and account of all men who belong to or who have belonged to the company. A record of vaccinations will be kept on these blanks.

"There will also be kept a document file, orders and instructions received from higher authority and retained copies of the various rolls, reports and returns required by regulations and orders.

"Where copies of orders affecting the company are not supplied, the orders will be copied, if practicable, attested by the Adjutant, and placed on the order file."

Paragraph 281. "There will also be kept in each company or detachment full information respecting all equipment and other property held

on memorandum receipt, showing list of articles, date of receipt, from whom received, and the name of the officer who signed the memorandum receipt thereof; also an account of all articles turned in, expended, stolen, lost or destroyed; and the company or detachment commander will have a settlement with the staff officers concerned quarterly and when relinquishing his command.

"Of the books, reports and papers referred to in this and in the preceding paragraph, the correspondence book, the document file, the service records of enlisted men, the muster rolls, the monthly returns and all other returns of the personnel, will be permanently preserved.

"Division and department orders, except extracts of special orders, will be disposed of under instruction of the division or department commander when the company is relieved from duty in the division or department.

"The other books, reports, and papers will be kept five years, reckoned from the close of the period of their use in case of books and reports and from their dates in case of papers, when they will be destroyed under direction of the Commanding Officer."

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE V

SERVICE RECORD

Introductory,

Nature of Service Record,

General Instructions,

Entries made by Recruiting Officer,

Descriptive List,

Indelible or Permanent Marks,

Current Enlistment

“Accepted for enlistment at,”

“Enlisted at,”

Method of filling out when man is drafted or inducted.

Report of Assignment,

By whom made out,

Where sent.

Other Entries,

Indorsements,

By whom made out,

Method of making out,

Military Record,

Court-Martial,

Allotments and Deposits.

Importance and Care of Service Record.

A personal record is kept of each soldier on Form No. 29, A.G.O. which is called a *Service Record*. This form follows the soldier throughout his service in the Army. It gives a complete statement of his services and of his accounts with the government. When a man enlists, the record is opened by the recruiting officer, while under the draft system this work is done by the company commander of the first organization to which the soldier is attached. In the latter case the information necessary for opening the record is forwarded by the soldier's local draft board. As the man changes from one organization to another, subsequent entries are made by company commanders, or for them by their clerks. Some of these entries require initialing by the company commanders themselves. Where this procedure is necessary, the service record itself carries instructions to that effect. Such instructions occur at the tops of pages on which the initialing is called for.

The following general information concerning the handling of a service record is printed on the first two pages of the form:

1. *Opening of Record.*—When a soldier is enlisted or reenlisted a service record on this form will be opened for him by the recruiting officer, who will fill out the Descriptive List, page 2, the Prior Service, and the first part of Current Enlistment, page 3. Other data called for by the printed headings or by these instructions will be supplied from time to time as occasion arises by the soldier's company or detachment commanders, care being taken to make the record complete and to keep it up to date at all times.

2. *Forwarding to First Station.*—When a soldier is sent from the recruit depot to a post, camp or regiment, for assignment, the adjutant, or other designated officer, at the depot will fill out the first indorsement and turn the service record over to the officer or noncommissioned officer in command of the detachment or department recruits; or, if no officer or noncommissioned officer be placed in command, the service record will be forwarded by mail to the proper commanding officer.

3. *Transmission to Company.*—Upon assignment of a soldier to a company, the post, camp or regimental commander will transmit the service record to the commanding officer of the company to which he is assigned, detaching the report of assignment and forwarding same to the Adjutant General of the Army.

4. *Soldiers Transferred or Detached.*—When a soldier is transferred or detached from his company, the company commander will fill out the second indorsement and transmit the service record to the soldier's new commanding officer in the manner prescribed in paragraph 2, above, in the case of soldiers leaving the recruit depots. Subsequent endorsements will be filled out as the soldier's change of station or status requires, the original service record thus following the soldier wherever he goes. Each commanding officer forwarding the service record will retain an official copy of his indorsement, to which will be added the name of the soldier for purpose of identification.

5. *Data to be Included in Indorsements.*—Each indorsement will give the reason for the soldier's change of station or status, and his character and will contain a full statement of his accounts at the time. Under the heading "Due United States" will be noted all authorized stoppages for loss of or damage to government property or supplies; amount due on account of allotments, post exchange, post laundry, tailor, company fund, or transportation; and stoppages, including detained pay under sentence of a court martial and on account of absence from duty because of disease resulting from the soldier's own intemperate use of drugs or alcoholic liquor, or other misconduct. In short, all information required to be entered on the pay card and pay roll will be incorporated in the indorsement on the service record, the wording of the indorsement conforming to model remarks for such rolls prescribed by the War Department.

6. *Soldier Furloughed to Reserve.*—When a soldier is furloughed to the reserve, his service record will be forwarded by indorsement to the officer charged with keeping his records as a reservist. If the soldier is detached from his company at the time he is furloughed to the reserve, a copy of the indorsement forwarding the service record will be furnished his former company commander without delay.

7. *Soldiers Discharged, etc.*—When a soldier is discharged or otherwise separated from the service without being furloughed to the reserve, his service record will be closed and forwarded to the Adjutant General's Office. If the soldier is on detached service at the time of discharge, the officer having charge of the service record sends it to the Adjutant General and at the same time notifies the discharged man's company commander.

8. *Record of Court-Martial.*—When the service record of a soldier shows a sentence by court-martial, it will be accompanied by an authenticated copy of

the record of summary court-martial, or by an official copy of the order promulgating sentence in case of conviction by a general or special court-martial.

9. *Procedure in Case of Lost Record.*—In the event that a service record is lost, a report of the fact will be made to the Adjutant General of the Army, who will start a new service record, transmitting same to the recruit depot or station at which the soldier was enlisted. The new record will then be forwarded in turn to the commanding officers of the companies in which the soldier has served during current enlistment, each commanding officer repeating the indorsement required by paragraph 4, and making appropriate entries in the body of the record. Pending receipt of the new service record the soldier's pay and duty status will be determined from the data shown on the last pay roll on which his name appears, and from other records of the company or detachment with which he last served.

10. *Changes in Entries.*—Erasures of entries on a service record are prohibited. All changes in original entries must be made by drawing lines through the entries, and each change will be duly authenticated by the initials of the officer making it.

11. *Additional Space for Entries.*—In case the space under any heading, except "Deposits" in the body of the record proves insufficient, the entry will be continued under "Remarks," page 5. If the space under "Remarks" or "Deposits" is insufficient, additional sheets may be securely pasted at the bottom of the page, as indicated by foot note. If the space for showing change of station or status in an indorsement is insufficient, the entry will be continued under "Due United States." One indorsement may, if necessary, occupy the space allotted to two. If there be more than 12 indorsements, an additional sheet will be securely pasted at the bottom of the last page of the form, as indicated by foot note. Under no circumstances will sheets or slips of paper be pasted or attached to a service record except as provided above.

12. *Initialing of Entries.*—Each entry under "Military Record," pages 4 and 5, and "Allotments," page 7, will be initialed by the recruiting officer or company commander, as the case may be. Where there are no data of record relating to a printed heading, the space under that heading will be left blank, except that in case of transfer to another organization or furlough to the reserve, the company commander will insert his initials in such blank spaces to show that he has not overlooked the entries. Negative entries, such as "None," "Nothing," etc., will not be made in any part of the form except as required for street and house number and indorsements.

In what is to follow there will be some repetition of the foregoing instructions. Repetition is for the purpose of emphasis, for a service record must be made out properly, since all matters regarding a soldier's rank, pay, and status in general are determined by the service record.

When an enlisted man is transferred or sent on detached service his record is forwarded by mail to his new commander. If a number of soldiers is being transferred at once an officer is usually sent with them. In such case the officer takes charge of the service records for the whole group. Upon the completion of a man's term of enlistment, his service record is closed by proper entries being made on it by the Commanding Officer of the last Company to which he belonged, and forwarded to the A.G.O.

Entries Made by Recruiting Officer.

Upon the enlistment of a soldier, a clerk in the recruiting office opens the service record by entering the soldier's name in ink, *printing out the characters, not writing them in script*; then he enters the arm of the service in which

the enlistment is made. Since the distinction between Regular Army, National Army, etc., has been discontinued, it is unnecessary now to pay attention to those terms, if found at the top of the service record. He then turns to page 2, and makes out the "Descriptive List." The method of doing this needs no explanation. Caution, however, should be observed in inserting the name and address of the person to be notified in case of emergency. If there is no street or house number the words "none given" should be written in. Other blank spaces require no insertions if there is no information pertaining thereto.

Under the heading "Indelible or Permanent Marks," tattoos, scars, or other blemishes are noted. Here a method of abbreviating is adopted, for example: Tattoo, anchor, left forearm.

On page three provision is made for giving information with respect to previous service in the Army or Navy. This is taken care of by the recruiting officer, as are also entries to be made under the heading "Current Enlistment." Under the caption last mentioned, some caution is necessary to avoid confusing "Accepted for Enlistment at" and "Enlisted at." *The place of acceptance for enlistment* may or may not be the *place of enlistment*. The date of enlistment is the date the man was sworn in.

In the case of a drafted man, the date he is ordered to report to his Local Board is inserted; the words "Accepted for enlistment" and "Enlisted, 191 " are stricken out, and immediately above the line beginning "by" is written "Reported to Local Board same place and date" or whatever place and date he did report. In case of voluntary induction the foregoing is handled in the same manner as for an enlisted man except that the words "Voluntary Induction" are written after the words "enlistment period."

Report of Assignment.

"Report of Assignment" is provided for on a perforated leaf affixed to the service record between pages two and three. This report is filled out by the commanding officer of the first organization to which the soldier is assigned. It is then immediately mailed to the Adjutant General of the Army, at Washington, D. C. In the case of a drafted man, this report is not filled out or mailed to the A.G.O. but is torn out and destroyed. Instead of it, a special form, printed on a pasteboard sheet, called "Enlistment & Assignment Card" is filled out and mailed to the A.G.O.

Other Entries.

In the case of a man who has enlisted at a recruiting depot, the "1st Ind." (first indorsement) on his service record is made out by the adjutant of the depot, when the soldier is sent to his first organization. The order, and its date, calling for the shipment of the soldier are here given.

Subsequent indorsements are made out by company clerks and signed by company commanders, whenever the soldier is transferred or sent on detached service. All indorsements must give the order calling for the soldier's transfer, the condition of his accounts with the government and a statement regarding his *character*. The blank space for indicating the man's character is filled out in the handwriting of the officer signing the indorsement, one of the three following expressions being used: Good, very good, excellent. No statement is made in this space regarding arrests or courts-martial.

The manner in which an indorsement is made is illustrated below:

2ND IND.

Fort George Wright, Wash.
Feb. 17, 1918.

To C. O. Camp Meigs, Washington, D. C.
This soldier transferred to your post per
telegram, A.G.O. 2-13-18.

He was last paid to include 1-31-18

By Capt. R. E. Grant, Q.M.C.

Due United States

Nothing

This soldier has an allotment
running.

His character is very good.

E. C. Emory,

Capt. 5th Coast Artillery, Commanding.

Company clerks should make out and file a copy of their own indorsement. This copy becomes a part of the company's permanent file; the reason for its retention will be apparent by turning to instruction number nine on the front cover of the service record.

Under the heading "Military Record" events in the service of the soldier are entered as they occur. Marksmanship, battles, wounds, medals of honor, certificates of merit, furloughs, changes in rank, and statements regarding arrests and courts-martial, are noted. When a soldier is tried by court-martial, a record of the trial is entered. The complete "Charge Sheet" is filed with the service record.

The blanks on pages six and seven regarding clothing are no longer used. A separate statement has been substituted therefor.

War risk allowances and insurance premiums will be entered on page 7 of the soldier's service record in space provided for "Clothing Settlements." On separate lines, the following notations will be made, leaving a vacant line under each notation to allow for notice of discontinuance. These entries must be made on their respective lines and on no others, Class A allotments being made on the first line, Class B the third line, Class C the fifth line and Class D the seventh line. In the event that there are no allotments of a certain class, the line will be left blank.

Class A. family allowance	\$.....per month
Class B. family allowance	\$.....per month
Government Insurance Premium	\$.....per month
Private Insurance Premium	\$.....per month

as the case may be. Class E allotments will be entered in space provided for allotments at the bottom of page 7, interpolating the words "Class E" before "Allotments" in the heading. (S.R. 72, par. 18.)

When a soldier makes a deposit of part of his pay, a record of such deposit is entered on page eight. The date, amount and officer with whom the deposit was made are noted. Since a large portion of a soldier's pay is being taken for allotments, insurance premiums and Liberty Loan subscriptions, or being withheld while he is on "overseas" duty, few deposits are being made.

Importance and Care of the Service Record.

The importance of service records cannot be overstated. They must be kept according to instructions, and in their handling no erasures are ever permissible. Incorrect entries are lined out and the necessary changes authenticated and initialed by the officer making the alterations.

Service records should be carefully kept in some manner so as to avoid tearing them. A good method is to keep each record in a separate jacket. Data

concerning the soldier can be written on the outside of this covering. A system of this kind will obviate the necessity of constantly turning to the record itself.

Considerable confusion has resulted from the interpretation of Bulletin No. 8 in regard to the temporary service record and pay card. The following is a copy of Paragraph 3, Bulletin No. 8, February 18, 1918.

"From communications received in this office relating to the loss of service records in transit, it is shown that in general the fault lies with commanders who have had but temporary jurisdiction over the men whose records are reported to be lost, due to the arrival and departure of the men before the receipt of the service records and the failure of the commanders to transmit the records when received.

"All commanding officers are enjoined to expedite the transmittal of service records of men transferred or detached and to use care in determining the proper address to which the record is to be forwarded.

"Application to the Adjutant General of the Army in compliance with instruction on the service record form should not be made until it is reasonably certain that the service record is lost, and effort should first be made to obtain the missing service record from the company or detachment with which the man last served.

"When an enlisted man is transferred, assigned, or attached to a company or detachment and is again transferred or detached before the service record has been received, a temporary service record will be prepared from available data and forwarded to the new company or detachment for use until the original or a new record obtained through instruction 9 on the blank form is received, when the temporary record will be filed with the company or detachment receiving the original or new record. Temporary service records will be marked "Temporary" at the top of the first page or brief by the officers starting such records.

"Correspondence received in this office also indicates that some company or detachment commanders are withholding pay from enlisted men because of missing service records. Substantially all data on the service record affecting the man's pay are copied from the pay rolls and other records of the company or detachment with which he last served, and prompt action should be taken by the new company or detachment commander, in case of loss of a service record, to obtain the data necessary to pay the soldier as provided in the last sentence of instruction 9 on the service record form, which reads as follows:

"Pending receipt of the new service record, the soldier's pay and duty status will be determined from the data shown on the last pay roll on which his name appears, and from other records of the company or detachment with which he last served."

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE VI

MORNING REPORT

SICK REPORT

DUTY ROSTER

DELINQUENCY RECORD FORM 509 Q.M.C.

RECORD OF COURTS-MARTIAL

ARMY PAPER WORK

All paper work in the Army must be in accordance with prescribed methods and no deviation from these methods is ever permissible. When reports and returns come into a central office in large numbers, it is essential that they be made uniformly and that they be correct.

United States Army Regulations expressly state just what books of record, reports, and papers are to be kept in each company. The Adjutant General's Office provides the necessary blank forms. Clerks connected with company administration must familiarize themselves with these. As Army Regulations are changed quite frequently it behooves a company's administrative force to keep them posted to date.

The first paragraph in "Army Paper Work," by Colonel James A. Moss, reads as follows:

"As irksome as paper work may be to many people, it is nevertheless an essential feature of military life, being as necessary in its way, as any other part of the military profession, forming, as it does, an important part of Army Administration. It is, therefore, a subject in which officers, sergeants-major, first sergeants, company clerks, and others should be proficient. However, it must be remembered that proficiency in paper work, like proficiency in anything else, requires work and attention to business."

MORNING REPORT

Every officer and enlisted man of the Army on the active list, and every retired officer and enlisted man on active duty, except individual officers detached and serving alone, will be accounted for daily on a morning report. Four forms for morning reports are provided, viz:

Company morning report (Form No. 332, A.G.O.).

Headquarters company morning report (Form No. 333, A.G.O.).

Headquarters morning report (Form No. 334, A.G.O.).

Consolidated morning report (Form No. 336, A.G.O.).

The company morning report is made out daily and transmitted usually before nine A.M. of the day following that covered by the report to the Sergeant-Major. The morning report day is the period from midnight to midnight, and the report shows by tabulation the condition of the company at the end of the day covered by the date of the report, and by appropriate explanatory remarks, all changes in duties and status of officers and enlisted men that have occurred during the day.

With respect to the status of the personnel of the company, the report is detailed, giving the number of men on extra or special duty, sick in quarters, sick in hospital, absent with or without leave, in arrest or confinement. This is shown on the left-hand page which is ruled and headed for the purpose.

The opposite page is used for remarks, covering any changes within the company since the previous report. Additions to the company by reason of assignment of men, etc., or deductions from the company for men on furlough or sick in hospital, etc., are shown under remarks.

Since it would be impossible for the company clerk to remember all the information necessary for the making out of his morning report, it is well to make memoranda at the time of the occurrence of events so as to avoid the possibility of overlooking anything when the report is made up.

When a man first reports to the company his identification number is entered on the page provided for remarks. It is not necessary to make this entry in case a man returns to the company after being on furlough or in the hospital. The column headed "Sick in Hospital" should be ruled into two columns, and one marked "B" and the other "I." Men sick in the base hospital are carried in column "B," those sick in the infirmary in column "I." A man who is sick is carried as present, if he was not removed from the camp.

A few technical expressions are used in the morning report which require a little precaution. Columns are provided for men on *extra* and *special duty* and detached service. If a man is detailed to work away from his company, receiving no extra compensation for it, he is considered as being on *special duty*. If on the other hand, he does receive extra pay he is considered as being on *extra duty*. A man is on detached service when he is removed from the immediate control of his company.

In the column for "Remarks" will be carefully recorded all changes of duty and status of officers and enlisted men, as follows:

(a) *Date and Hour of Change*.—In case of a change of duty or status that occurred on a date prior to that covered by the report, the actual date of the change will be stated. The absence of a date after a remark indicates that the change occurred on the date covered by the report.

The hour a change of duty or status occurs will not be stated except when necessary to determine additions and deductions of rations.

Examples:

- (1) "Duty to hosp." (Usual form of remark.)
- (2) "Duty to hosp. Mar. 15/18." (Form of remark in case the soldier was admitted to hospital on a date prior to that of the report.)
- (3) "Duty to hosp. 4.00 p.m."

(b) *Change of Grade*.—All changes of rank or grade.

Examples:

- (1) "Corp Caswell aptd sgt."
- (2) "Sgt Roth aptd mess sgt."
- (3) "Corp Bruce rd to pvt."

If the officer or enlisted man is not "for duty" on the date of the change of rank or grade, his actual status will be indicated.

Example: (4) "Corp Caswell aptd sgt SD."

(c) *Assignment*.—The fact of assignment and whether or not the officer or enlisted man has joined the command, and if not, his status.

Examples:

(1) "Assgd to and joined Co."

(2) "Assgd to Co. DS en route to join."

(d) *Transfer*.—The organization, corps, department, or station from which or that to which transferred, with statement showing whether or not the officer or enlisted man has joined his new command, and if not, his status:

Examples:

(1) "Transfd fr Co. B. Joined."

(2) "Transfd to 15th MG Bn. Attached for duty."

(3) "Transfd fr 56th Depot Brig. DS en route to join."

(e) *Changes in Command*.—All changes in command.

Examples:

(1) "Capt Smith assgd to, joined and assumed comd. Lt. Jones reld comd."

(2) "Capt Smith duty to hosp. Lt. Jones assumed comd."

(3) "Lt. Jones reld comd. Duty to SD. Lt. Williams assumed comd."

(4) "Maj. Arnold joined and assumed comd. Capt Smith reld comd."

(5) "Maj. Arnold duty to hosp. Capt Smith assumed comd."

(6) "Maj. Arnold hosp. to duty. Capt Smith reld comd."

(f) *Extra and Special Duty*.—Notation concerning the assignment to or relief from any extra or special duty that removes an officer or enlisted man from the performance of the usual and customary duties of his office or grade. *Special duty to be performed in addition to the usual or customary duty will not be noted.*

Examples:

(1) "Duty to SD."

(2) "SD to duty."

The nature of the extra or special duty will not be stated on the morning report. (See also subparagraph i, Detached Service.)

(g) *Sickness*.—All cases of sickness, and when the sickness is the result of an injury or wound, a brief statement of the nature of the injury or wound and whether or not contracted in line of duty.

Examples:

(1) "Duty to sick in qrs."

(2) "Duty to hosp. 3 p.m."

(3) "Hosp. to duty."

(4) "Hosp. to sick in qrs."

(5) "Duty to hosp. Injured during bayonet training. LD."

(6) "Duty to hosp. Wounded in action. LD."

In reporting the departure of an officer or enlisted man to enter a general or base hospital or a hospital at another post, camp, or station, or in reporting his return therefrom, the name or location of the hospital will be stated.

Examples:

(7) "Hosp. to en route to Walter Reed GH."

(8) "Duty to absent sick Ft. Jay, NY."

(9) "Absent sick Ft. Jay, NY., to duty."

(h) *Arrest and Confinement*.—All cases of arrest and confinement. In case of arrest or confinement at another post, camp, or station, the name of the post, camp, or station will be stated. In case of confinement by civil authority, the remark will show the nature of the offense and whether the prisoner has been held for trial, tried, or discharged without trial, and, when tried, whether acquitted or convicted.

Examples:

- (1) "Duty to arrest."
- (2) "Arrest to hosp."
- (3) "AWOL to conf."
- (4) "Conf to en route to conf at Ft Sheridan, Ill."
- (5) "Conf to duty."
- (6) "Conf at Ft Sheridan, Ill. to duty."
- (7) "Duty to absent in hands CAuth, Baltimore, Md." Held for trial on charge of larceny."
- (8) "Absent in hands CAuth, Baltimore, Md. to duty. Released without trial."

(i) *Detached Service*.—All absence on duty exceeding 24 hours, with place of absence.

Examples:

- (1) "Duty to DS at Ft Porter, NY."
- (2) "DS at Ft Porter, NY, to duty."

Duty with another organization at the same post or station will be reported as special duty and not as detached duty.

(k) *Absence With Leave*.—Departure and return in all cases of absence of officers with leave and of enlisted men on furlough. The period of absence authorized will be stated in reporting departure.

Examples:

- (1) "Duty to lv 10 days."
- (2) "SD to fur 7 days."
- (3) "Lv to duty."
- (4) "Fur to duty."

(l) *Absence Without Leave*.—Departure and return in all cases of absence without leave.

Examples:

- (1) "Duty to AWOL."
- (2) "AWOL to arrest."

(m) *Missing in Action*.—The number of officers and enlisted men by grade missing in action or captured by the enemy.

Examples:

- (1) "1 sgt, 2 corps, and 3 pvts missing in action."
- (2) "4 pvts captured by enemy."

Complete information including names of officers and enlisted men missing in action or captured by the enemy will be given under Record of Events.

(n) *Attachment*.—Attachment of officers and enlisted men for duty or for rations only, and relief therefrom. In case of attachment for rations only the names of those attached will not be stated.

Examples:

- (1) "Lt Jones attached for duty."

- (2) Lt Jones, attached, reld fr duty with Co."
- (3) "Transfd to 15th MG Bn. Attached for duty."
- (4) "3 EM attached for rations 2 p.m."
- (5) "3 EM, attached for rations, left Co 10 a.m."

(o) *Resignation, Discharge, and Dismissal of Officers.*—Fact of resignation, discharge or dismissal.

Examples:

- (1) "Capt Smith resigned."
- (2) "Lt Jones disch."
- (3) "Lt Williams dismissed."

(p) *Discharge and Furlough to Reserve of Enlisted Men.*—Fact of discharge or furlough to reserve. The word "discharged" abbreviated "disch," will be used to cover all classes of discharges.

Examples:

- (1) "Duty to disch."
- (2) "SD to fur res."

(q) *Death, Retirement, and Desertion.*—Fact of death, retirement, or desertion.

Examples:

- (1) "Corp Sharp, hosp, died."
- (2) "1st Sgt Cameron, DS, retired."
- (3) "Pvt 1cl Jones, E.J., AWOL to desertion."

(r) *Return of Deserter to Military Control.*—Fact of return to military control and status.

Example:

"Desertion to conf."

Note.—In the examples under this paragraph the names have been omitted except where they were necessary to illustrate the remarks.

In making entries under the head of remarks, it is a good rule to always enter a man's army serial number immediately following his name.

On the "*remarks*" page are columns headed "*Rations*" for both men and animals with plus and minus columns. In these are indicated respectively additions and deductions to the ration credit of the company as a result of the changes in strength indicated by the remarks. A ration is the authorized allowance of food for one man for one day for three meals. The ration period is usually ten days (in some cases thirty days). By means of the ration return, Form Q.M.C. 223, rations are drawn by the company for the total number of men eating at its mess during the period. When men are added to the organization, credit is taken for the additional rations by the entry, in the plus column on the morning report, of the total number of rations required for them. In the same way by making entries in the minus column deductions are shown for men leaving the company. These additions and deductions are based upon the remaining days of the ration period. When men are messed for only a part of a day, the credit or deduction is determined by dividing the total number of meals furnished by three and taking account to the nearest whole number. Thus the fraction of one-third would be disregarded while the remaining two-thirds would count as a full number.

For example, if two men leave the company on the evening of the fourth day of a ten day ration period, the deduction for two men for six days, or twelve rations would be shown in the minus column. If five men join the company after dinner on the fifth day of a ration period, an addition is made for

five men for $5\frac{1}{2}$ days or $26\frac{3}{4}$ rations which are counted as 27 rations. An entry in the remarks column, when no time is stated, is assumed to have occurred after breakfast, on the date of the report.

If a man is sick in the base hospital, he is dropped for rations, although carried as present, for the reason that the hospital is drawing rations for him. When there are no entries to be made in the remarks column for a day, the words "No Change" are written immediately after the date.

Comprehensive instructions are included in the form for the morning report which help in making it up. The morning report should present little difficulty. Care, more than anything else, is required. The company clerk should go over the report carefully before it is handed to the company commander for his signature. It is a good idea for the clerk to compare his entries for the day with those made on the day previous to insure the making of all necessary changes. A check on the columns for indicating the men present and absent can be made by comparison with the strength of the company. To insure a neat report when many entries are to be made on the page headed "Remarks," it is a good custom to write out the remarks on a piece of paper and then copy them into the report.

SICK REPORT

The Sick Report, Form A.G.O. 339, is a simple form, made out by the Company Clerk. It provides for the following information: the names and rank of men taken sick, when sickness took place, if sickness was incurred in line of duty or not, and the disposition of the case. If the clerk does not know sickness was incurred in line of duty, he indicates doubt by using a question mark. On the line immediately under the last name entered for the day, the Company Commander signs his name and rank.

The sick men accompanied by a non-commissioned officer with the sick report, are sent to the hospital where a medical officer makes disposition of the men. He indicates on the "Medical Officer's Report" whether a man shall be held in the hospital or sent back to his company. Men sent back to their company are marked either "Quarters" (meaning sick in Quarters) or "Duty" (meaning "Available for Duty"). The Medical Officer after having examined all the men, attaches his signature to his part of the report, which is then returned to the company from which it came.

Disease or injury is reported in line of duty unless it is known that it existed before the man entered the service or was incurred while the man was absent without leave. Incapacity due to immoral conduct will not be considered as having come about in line of duty. Sometimes there is a discrepancy of opinion between the commanding officer of a company and the medical officer as to whether or not sickness was incurred in line of duty. Compilation of War Department Orders, paragraphs 54 and 229 provide for settlement of the difference.

Erasures are never made on the sick report. Mistakes are corrected by lining out the entry, the officer signing then places his initials in the margin opposite. This procedure insures against unauthorized alterations.

DUTY ROSTER

The duty roster A.G.O. Form 342 is a systematic record of all fatigue work performed by the enlisted men of a company. It is maintained for the purpose of distributing equally the guard or other duties of a company.

The duty roster for troops, batteries, companies and detachments shows the names of all enlisted men of the organization and consists of two parts.

The Roster for Guard Duty.

The Roster for Other Duties.

The *Guard Roster* is for the purpose of equally distributing the guard duty to the enlisted men of the company, troop, battery or detachment.

The man longest off duty, as indicated by roster numerals, is the first to be used for detail for such duty. Each man is credited each day with the number of days that he has remained present and available for duty since the beginning of his last tour. When unavailable on account of absence without leave, in arrest, in confinement, or on pass, men are credited the same as they would have been if they had remained present and available for duty, the numerals being inserted in the same square just above the letters indicating their proper status. Men returning to duty from furlough, detached service, extra duty, or special duty start in where they left off. Departures from these instructions may be authorized by the commanding officer when a strict application would allow improper advantage or work a hardship.

If available but not required for guard duty, in the proper place opposite the soldier's name will be placed the numeral showing the number of days since he performed guard duty. Any special guard duty, such as stable guard, may be similarly indicated with the addition of the initial letter in the open half space. The detail for supernumerary should, as a rule, fall on the men next for detail. This, however, may be varied so as to even up the detail.

Following is a list of the abbreviations which should be strictly adhered to:

- A Absent without leave.
- Ar Arrest in quarters.
- C In confinement.
- D C On detached service.
- E D On extra duty.
- F On furlough.
- P On pass.
- Rct Recruit.
- S D On special detail.
- Sk Sick.

Roster for Other Duties.—At the beginning of the month is inserted in the proper column, opposite each man's name, the date when he last performed the duty specified, using the abbreviated name of the month and the numeral. When a detail for any one of these duties has been determined upon (in accordance with general instructions) draw a line through this date and insert in the same place the numeral indicating the day of the month. If detailed again for this duty during the month, draw a line through this last date and again insert in the space the new numeral and so on.

The necessary entries relative to any regular duties not specified on the roster will be shown in one of the blank columns provided for that purpose, the nature of the duty being shown in the heading of the column. In case of a detail for detached service, a hyphen should follow the numeral, which merely indicates the day of departure. But since detached service is the only variable duty as regards length of time, it is the day of return that determines when last performed, hence upon the man's return from detached service, draw a line through date of departure and insert the date of return after the hyphen. At the end of the month the date of last performance of each duty is transferred to the proper spaces on the roster for the ensuing month.

The duty roster should be kept by the first sergeant. In his absence it is the duty of the company clerk to keep it. He should at all times be familiar with the keeping of the roster as he will be called upon to answer numerous questions in regard to duties performed by the enlisted men of the company.

Extra and Special Duty.—*Extra duty* occurs when an enlisted man is detailed to perform specific services, which removes him temporarily from the ordinary duty roster of the organization to which he belongs, provided he receives increased compensation for same. *Special duty* is that performed by the enlisted man in the same way except that no extra compensation is paid. He is also removed from the regular duty roster.

DELINQUENCY RECORD

The following is quoted from the Articles of War:

“Art. 104. Under such regulations as the President may prescribe, and which he may from time to time revoke, alter or add to, the commanding officer of any detachment, company, or higher command may, for minor offenses not denied by the accused, impose disciplinary punishments upon persons of his command without the intervention of a court-martial, unless the accused demands trial by court-martial.”

For each punishment awarded, the commander will cause a brief record to be made showing:

- (a) Name of accused.
- (b) Brief statement of offense, including time and place.
- (c) Statement as to whether or not accused demanded trial by court-martial. To be effective such demand must be made before award of punishment by commanding officer.
- (d) Disposition of case, with date and punishment awarded, if any.
- (e) Whether or not appeal was made to higher authority.
- (f) Decision of higher authority on appeal.
- (g) Whether or not accused was required to serve punishment pending appeal.

The Delinquency Record Form No. 509 Q.M.C., is used for this purpose.

RECORD OF COURTS-MARTIAL

A copy of all charges preferred against men in the organization, Form 594, A.G.O., must be kept as a permanent record. Charge sheets are prepared in triplicate. One copy is retained in the office appointing the summary court, one copy forwarded to the officer exercising general court-martial jurisdiction over the command, and the third copy returned to the company. It includes a statement of charges preferred, with a record of the disposition of the case by the court martial.

These remarks apply only to causes tried by summary court; the charges, findings and sentences of special and general courts-martial are published in the form of orders.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

TYPICAL QUIZ QUESTIONS

Typical quiz and examination questions on the preceding lectures of the course.

1. Name the divisions of the General Staff Corps.
2. Give the functions of the Purchase, Storage and Traffic Division of the General Staff Corps.
3. Name the Special Staff Corps.
4. What are the duties of the Quartermaster Corps?
5. What are the duties of the Adjutant General's Department?
6. What are the duties of the Ordnance Department?
7. Distinguish between Line and Staff.
8. What are the principal changes in the present organization of the division from previous times?
9. Name the territorial departments and give the location of their headquarters.
10. Name the classes of motor vehicles and state what jurisdiction the Motor Transport Corps has over each.
11. Outline the organization of M.T.C. A.E.F.
12. State the steps taken by an officer to secure his pay.
13. Outline the organization of a Motor Transport Company.
14. What is a pay card, A.G.O. 644?
15. What is meant by military channels
16. Write a military letter with one indorsement.
17. What disposition is made of the service record of a man upon his separation from the service?
18. Describe the Sick Report.
19. Describe the Duty Report.
20. Describe Delinquency Record, Form 509, Q.M.C.
21. Outline the procedure to be taken in the case of record of court-martial, Form 594, A.G.O.
22. What period does the morning report cover?
23. Write model remarks for the following items:
One private went to the hospital at 9.00 A.M.
Two corporals were assigned to outside work.
One sergeant went on a furlough at 2.00 P.M.
24. Are men in the base hospital listed as present or absent, on the morning report?
25. When is a man in arrest or confinement listed as absent on the morning report?

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE VII

RATION RETURN

COMPANY FUNDS

COMPANY COUNCIL BOOK

SOLDIERS' DEPOSITS

SOLDIERS' DEPOSIT BOOKS

MANUAL COURTS-MARTIAL CHAPTERS I TO IV

RATION RETURN

The ration return, Q.M.C. Form 223, is the means by which an organization provides for obtaining subsistence. Its purpose is to establish the amount of ration credit against which an organization may draw supplies of food and other necessary supplies.

The ration return is submitted to cover a period of either ten or thirty days, and is in effect a requisition calling for a total number of rations to be required during that period. This total is arrived at by multiplying the total number of enlisted men present with the company on the date of the return, by the number of days in the period. To this total is added or subtracted the net difference between the additions and deductions for the previous ration period as indicated by the remarks page of the morning report. For example, if the strength of a company is 200 men on the morning of January first, the ration return would call for 2,000 rations for the ration period January first to tenth. Assuming further that in the previous ten day ration period the total additions in the morning report were 140 and the total deductions 110, the net difference, or 30, would be added (in this case) to the 2,000 rations so that the ration return would call for 2,030 rations, instead of 2,000.

Spaces are also provided in the ration return for requisitioning supplies of matches, candles, toilet paper, ice and other articles of subsistence stores which are not issued in the form of rations, but as "Authorized Issues," in accordance with the standard allowances. These allowances are in the proportions as given above.

THE COMPANY FUND & COUNCIL BOOK

1. General Purpose of Company Fund.
2. The Company Council Book.
3. Mess Fund and General Fund.
 - a. Must be kept separate.
 - b. Source of each.
 - c. Use of each.

4. System of Keeping Accounts.

a. Vouchers.

b. Illustration of entries in Council Book.

The men of our Army need some provision that will insure them a few pleasures. Men cannot be contented and happy without respite from duties. They require recreation. A company commander is expressly entrusted with providing for the contentment and harmony of his command. A splendid method has been worked out whereby a *company fund* has become available for the purchase of athletic equipment, pianos, victrolas, extra food, etc. A company council consisting of all officers of the company holds regular monthly meetings at which expenditures for the past month are checked and necessary expenditures for the next month authorized. A Company Council Book, Form No. 452, Q.M.C. is kept in which are entered all receipts and expenditures from the company fund, together with the minutes of council meetings.

The company commander is custodian of his company's fund; he must take care that a strict account is kept of all receipts and expenditures, and that expenditures be for proper purposes only. A. R. Par. 327 authorizes the establishment of company tailor shops, barber shops, the company billiard and pool tables, and subject to the approval of the Post Exchange Council of company shoe repair shops and company laundries from which revenues may be derived. Salaries are allowed attendants for company equipment. (a) "The company fund is not intended for expenditure in the purchase of articles to facilitate the transaction of business in a company. On the contrary, the legitimate and proper application of this fund is in supplementing the articles already furnished by the supply departments for the purpose of increasing the comfort, pleasure, contentment, mental and physical improvement of the company. To accomplish this purpose, disbursements of company funds are authorized." The foregoing is construed as not prohibiting the purchase and repair of typewriting machines from the company fund, providing the officer responsible for the expenditures from that fund decides the same are made solely for the benefit of the company.—(Par. 106 C.W.D.O.).

The fund consists of two parts, the Mess Fund and the General Fund. The former is made up of all savings of rations allowances; the latter consists of moneys from all other sources, some of which are, canteen and post laundry dividends and proceeds from the use of pool tables. A separation of funds is necessary in order to comply with the Army Regulations which require that money accruing from the rations account of a company be spent for food only. The foods purchased consist for the most part of perishable articles such as fresh fruit and vegetables which usually are kept on hand by the subsistence department. The purchase, from the mess fund of cows and forage for their keep, is allowable. The rental of land for gardening, however, is not permissible. Neither can beer be purchased from the mess fund, for Congress has prohibited the sale of or dealing in intoxicating liquors upon any premises used for military purposes. Use of the mess fund is further limited by the following:

"The purchase from the mess fund of any article which can be obtained on requisition from a supply department is forbidden, except that, with the approval of the post commander such articles may be purchased if necessity exists for their immediate use and they are not on hand for issue at the post." (A.R. Par. 322.)

The council book provides space for a list of property with the cost thereof, purchased from the company fund; for keeping accounts; for certificates by company commanding officers that entries are correct; and for certificate of inspection by the post or battalion commander.

The method of keeping the mess fund and general fund is prescribed. Entries for expenditures should show the amount paid, the date, to whom, and for what payment was made. All this should be noted briefly, but with the essential points covered carefully and exactly. All moneys received or paid out must be accounted for on a proper voucher showing the source from which the money was derived and the amount, or in the case of an expenditure, a properly receipted bill. Vouchers should be filed in such a way as to facilitate inspection; i. e., in the same order as the corresponding entries appear on the page for accounts in the council book. The following are illustrations of vouchers for a receipt and an expenditure respectively:

Camp Lewis, Wash.,
Aug. 10, 1918.

Turned over to Capt. Paul G. Rutten, eighty (80) dollars receipts from dance held Saturday, Aug. 8, 1918.

1st Sgt. J. D. O'Hare,
Co. A. 14th Inf.

Tacoma, Wash.,
Aug. 10, 1918.

Received of Capt. Paul G. Rutten, \$150.00 for victrola purchased for Co. A. 14th Inf., Camp Lewis, Washington.

S. M. Kane,
Mgr. Johnson's House of Music.

Funds are usually kept in a bank, and are deposited in the name of the company, the commanding officer being authorized to draw checks. In case there is a change of company commander, it becomes necessary to inform the bank authorizing the new officer to write checks. A note to the bank like the following will serve the purpose:

Camp Lewis, Wash.,
Aug. 10, 1918.

I have this day transferred the company fund of Co. A. 14th Inf. to Capt. Miles E. Cary who from now on will have authority to draw against the fund.

Paul G. Rutten,
Capt. 14th Inf.

Another method of effecting the transfer would be to draw a check for the amount of the company's balance in favor of the relieving officer.

A careful study of the following samples of how accounts are kept in a company council book and how they are certified and inspected will be helpful.

In Account with Company Fund, Co. A, 14th Inf.

Voucher	Date		Ration Savings		Other Funds	
			Receipts	Expend.	Receipts	Expend.
1	1	Bal. fr. last mo.....	500.00		200.00	
2	1	Ration savings for Aug.....	100.00			
		Cook J. Smith extra pay for Aug.....				7.50
3	2	Post Ex. Dividend for Aug.....			100.00	
4	4	Board of Co. Tailor for Aug.....	10.00			
5	7	Collections from pool table for Aug.....			50.00	
6	7	Barber shop for Aug.....			10.00	
7	9	A. P. Co. Fresh meats bill Aug. 28, 1918.....		100.00		
8	10	Columbia Phone Co., 10 cylinders, Aug. 15, 1918.....				2.50
		Totals, receipts and expenditures.....	610.00	100.00	360.00	10.00
		Balances carried forward.....		510.00		350.00
		Totals.....		610.00		360.00

Company Commander's Certificate

I certify that the foregoing account for the month of September, 1918, is correct and the amount for which I am responsible, eight hundred and sixty (\$860.00) dollars is deposited with the Tacoma National Bank to the credit of the Company Fund, Co. A. 14th Inf., Sept. 30, 1918.

Paul G. Rutten,
Capt. 14th Inf.
Commanding.

Inspecting Officer's Statement

Sept. 30, 1918.

I certify that in accordance with Army Regulations I have this date inspected the foregoing account for the period July 1, 1918, to Sept. 30, 1918, inclusive, and I find it correct.

John Smith,
Major, 14th Inf.

SOLDIERS' DEPOSITS

Any enlisted man of the Army may deposit his savings in sums not less than \$5 with any Army paymaster (now quartermaster) who shall furnish him with a deposit book in which shall be entered the name of the paymaster (now quartermaster) and of the soldier, and the amount, date, and place of such deposit. The amount so deposited shall be accounted for in the same manner as other public funds and shall be deposited in the Treasury of the United States and kept as a separate fund, known as "Pay of the Army, deposit fund," repayment of which to the enlisted man on discharge from the service shall be made out of the fund created by said deposits, and shall not be subject to forfeiture by sentence of court-martial, but shall be forfeited by desertion, and shall not be permitted to be paid until final payment on discharge, or to the heirs or representatives of a deceased soldier, and that such deposits be exempt from liability for such soldier's debts: *Provided*, That the Government shall be liable for the amount deposited to the person so depositing the same. (R. S. 1305, amended by act June 12, 1906 (34 Stat., 246); G. O. 115, 1906).

NOTE—The exemption of deposits from liability for the soldier's debts has application only to his personal debts. (Comp. Mar. 2, 1910—United States Navy case; P.M.G.O., 81469.) (See par. 1321 Q.M.M.)

SOLDIERS' DEPOSIT BOOKS

Deposits of pay by enlisted men, and entries in deposit books and records pertaining thereto. (A. R. 1361, 1913.)

A Soldier's Deposit Book, Q.M.C., Form 41, will be furnished to every soldier making deposits with the Q.M. as above set forth. Such deposits are to be receipted for by the Quartermaster and attested to by the Company Commander. The book is kept by the soldier and must be presented with his final statement for payment. It cannot be assigned or transferred, nor can the soldier withdraw the money until he is separated from the service.

COURTS-MARTIAL

The instructor will read Chapters I to IV Manual of Courts-Martial covering the following points:

Source and Kinds of Military Jurisdiction.
Exercise of Military Jurisdiction.
Persons Subject to Military Law.
Classification of Courts-Martial.
Composition of Courts-Martial.
General Courts-Martial.
Special Courts-Martial.
Summary Courts-Martial,
Jurisdiction in General.
Jurisdiction of General Courts-Martial.
Jurisdiction of Special Courts-Martial.
Jurisdiction of Summary Courts-Martial.
Jurisdiction of other Military Tribunals.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE VIII

ACCOUNTABILITY AND RESPONSIBILITY

MANUAL COURTS-MARTIAL, CHAPS. V TO VIII

EQUIPPING A COMPANY

ACCOUNTABILITY AND RESPONSIBILITY

The following is quoted from Par. 657 Army Regulations on the subject of accountability and responsibility for public property:

"Accountability and responsibility devolve upon any person to whom public property is intrusted and who is required to make returns therefor. Responsibility without accountability devolves upon one to whom such property is intrusted, but who is not required to make returns therefor. An accountable officer is relieved from responsibility for property for which he holds a proper memorandum receipt. A responsible officer is not relieved from responsibility for public property for which he has given memorandum receipt until he has returned the property to the accountable officer or has secured memorandum receipt from a successor, or until he has otherwise been relieved by the operation of regulations or orders."

It is essential in dealing with property to determine the difference between the terms "Accountability" and "Responsibility" as used in connection with government supplies.

Accountability for property devolves upon any officer who is required to *keep records* of and *render returns* for, the property with which he is charged. Such property may or may not be in his possession, but his accountability is concerned only with the matter of accounting for the property, not with its actual possession. Only commissioned officers may be accountable for property except in extreme cases of ungarrisoned posts when Ordnance and Quartermaster Sergeants may act as accountable officers.

Responsibility with or without accountability, devolves upon any one to whom public property is intrusted and who is answerable for its care and use. Responsibility is practically inseparable from possession. Both officers and enlisted men may be responsible for property held by them. Whether or not the officer is also accountable depends not on the element of possession but on the question of whether or not he is required to account for or render returns for the property under consideration.

The term "Accountability" implies that certain periodical reports or returns of property transactions are required, and vouchers to evidence such transactions both as to receipts and transfers are necessary to substantiate entries on such reports or returns.

The term "Responsibility" implies a military and pecuniary obligation on the part of an officer or other person to control and preserve material intrusted to his care in such manner as to serve the best interests of the Army. There will be a great many officers and other persons who will not be required to render accounts for motor vehicles intrusted to them, but the fact that such officer or other person is not required to render an account or return of such property in no sense relieves him of the responsibility as just defined, which is automatically imposed on him when any public property comes under his care or control, nor of the obligation to maintain according to conditions of the service a reasonable record or statement of his stewardship or to furnish evidence, when properly called for, of the disposition which he has made of motor vehicles for which he is responsible.

A company or detachment commander is responsible for all public property pertaining to his company or detachment, and will not transfer his responsibility for same to his successor during periods of absence of less than a month unless so ordered by competent authority; when such absence exceeds a month the question of responsibility is settled by the proper higher commander.

The property responsibility of a company commander cannot be transferred to enlisted men. It is his duty to attend personally to its security.

Transfer of public property by an accountable officer involves a change of possession and accountability. In ordinary cases of transfer, the transferring officer will forward to the receiving officer four copies of the combination invoice and receipt (Form No. 600 A. G. O.), properly executed to cover the property transferred. Two of these copies will be signed by him in the space provided for the signature of the issuing officer; the other two copies will be signed by the receiving officer in the space provided and returned to the issuing officer.

Form No. 600 A. G. O. should be introduced in class.

Instructor will read Paragraphs 665, 666 and 667 of Army Regulations.

Memorandum Receipts. Transfer of responsibility without accountability is effected by means of Memorandum Receipts (Form A. G. O. No. 448). This is a form on which officers or enlisted men receipt to the accountable officer for public property intrusted to them. Responsibility, involving proper care and use of the property, is thereby transferred to the one signing the receipt, but accountability for the supplies in question still remains with the officer issuing same. He continues to carry the property issued on memorandum receipt on his property account and cannot drop it from accountability until it is worn out and disposed of under the laws. When property that has been issued on Debit Memorandum Receipt is returned to the accountable officer he will give a credit memorandum receipt for the property returned. This credit memorandum receipt will counterbalance the debit memorandum receipt that was signed when the property was issued and the officer receiving the credit memorandum receipt will be relieved of his responsibility for the property that is listed on this credit receipt.

There shall normally be but one accountable officer for equipment "C" of each bureau for a regiment, separate battalion or other tactical organization for which equipment "C" is prescribed, and such officer will account on a separate return for all articles listed in the various equipment manuals as equipment "C" and he will be referred to in the following remarks as "The Unit Supply Officer." When one officer serves as supply officer for all bureaus he will be designated as "Regimental, Train, etc., Unit Supply Officer," but when several officers serve as supply officers of the several bureaus each, except the Quartermaster Corps, will be designated as "Regimental. etc., Ord-

nance, Engineer, or Signal Officers" as the case may be. The supply officer of the Quartermaster Corps will be designated as "The Regimental, etc., Supply Officer." Should local conditions make it desirable or necessary to have an accounting officer for any detachment serving separately from its parent organization, one may be designated for that purpose, and the articles of equipment "C" that pertain to such detachment will be transferred to the designated accountable officer of the detachment, but as soon as the conditions making this separate accountable officer cease, the account will be closed by transferring back to the unit supply officer of the parent organization the accountability for the property which has been carried separately.

Companies or detachments will hold on memorandum receipt from the unit supply officer of the unit of which they form a part, articles of equipment "C" prescribed in the equipment manuals as pertaining to them. An accurate account of all equipment, including clothing, issued to the enlisted man will be kept by the company or detachment commander on Form No. 637 A. G. O. Individual Equipment Record, except that no record will be made of a transaction in which an article is turned in and replaced by a like article at the same time.

When an enlisted man is transferred or detached from his company or detachment, receipts for the articles of personal equipment or other public property, except clothing and individual mess equipment, which he carries with him or for which he is indebted to the United States at the time, will be prepared in duplicate on Form No. 600, A. G. O., and signed by the company or detachment commander as receiving officer, a separate set being prepared for each supply department concerned. The articles entered on receipt, including missing articles, will correspond to the articles shown on individual equipment record. The name of the accountable officer and the name and destination of the soldier will be shown on the receipts. The duplicate receipts will constitute the vouchers on which the accountable officer will drop from his return the articles enumerated. The accountable officer will forward, immediately in the case of ordnance equipment and with the return in other cases, one copy of the duplicate receipt to the chief of the bureau to which the property pertains, keeping the other for file with the retained copy of his return. He will furnish the company or detachment commander with a memorandum receipt credit slip listing the articles dropped and showing the name of the enlisted man.

On the arrival of the enlisted man at his destination the new company or detachment commander will prepare and sign invoices in duplicate on Form No. 600, A. G. O., of the articles, except clothing and individual mess equipment, appearing on the man's individual equipment record, a separate set being prepared for each supply department concerned. The invoices will give the enlisted man's name, his company or detachment, and the station from which he was transferred or detached. The duplicate invoices will constitute the vouchers on which the new accountable officer will take up on his return the articles enumerated. The accountable officer will forward, immediately in the case of ordnance equipment and with the return in other cases, one copy to the chief of the bureau to which the property pertains, keeping the other for file with the retained copy of his return. He will furnish the company commander with a memorandum receipt debit slip listing the articles taken up and showing the name of the enlisted man. All articles missing on arrival will be charged against the enlisted man in the usual manner.

When enlisted men are transferred in detachments, company or detachment commanders will prepare duplicate receipts on Form No. 600, A. G. O., which will be completed and disposed of as prescribed in the case of an individual

enlisted man, but all articles, including those for which the men are individually indebted to the United States, may be entered on a single set of forms, one set for each supply department concerned. The memorandum receipt credit slips may be similarly consolidated. Upon arrival of a detachment of enlisted men at their destination the new commanders of the companies or detachments to which the men are assigned will prepare duplicate invoices on Form No. 600, A.G.O., which will be completed and disposed of as prescribed in the case of an individual enlisted man. Both vouchers and memorandum receipt debit slips may be consolidated as above.

Articles of clothing and of the individual mess equipment, consisting of meat can, cup, knife, fork, and spoon furnished by the Ordnance Department, will be dropped from property returns by the accountable officers upon issue to enlisted men and will not be taken up again until the men are separated from the service (A. R. 1165), except such articles as the company or detachment commander may from time to time turn in to the accountable officer as surplus or unserviceable and not exchanged for other articles.

When such articles are to be turned in the company or detachment commander will prepare invoices in duplicate, on Form No. 600, A. G. O., and deliver them with the article to the unit, post, camp, or other supply officer, who will take up the articles on his property return furnishing the company or detachment commander with a receipt on Form No. 448, A. G. O., stating that the articles have been taken up on returns.

This receipt will show the name of the enlisted man and will be filed with his individual equipment record until the next succeeding visit of an inspector, after which it may be destroyed by the company or detachment commander.

COURTS MARTIAL

Instructor will read Chapters V to VIII inclusive, Manual for Courts Martial covering:

1. Arrest and Confinement.
2. Arrest of Deserters by Civil Authorities.
3. Preparation of Charges.
4. Action upon Charges.
5. Organization of Courts Martial—
 - (a) Members.
 - (b) Judge Advocate.
 - (c) Assistant Judge Advocate.
 - (d) Counsel.
 - (e) Reporter.
 - (f) Interpreter.
 - (g) Challenges.
 - (h) Oaths.
 - (i) Continuances.
 - (j) When completed.

EQUIPPING A COMPANY

The following shows the equipment required by a Motor Truck Company:

Personal (Individual) Equipment
(For each member of the company)

Ordinance Property

For all enlisted men except truckmasters and mechanics:

1 United States rifle, calibre .30	1 Haversack
1 Front-sight cover	1 Knife
1 Oiler and thong case	1 Meat can
1 Thong and brush	1 Pack carrier
90 Ball cartridges, calibre .30	1 Pouch for first-aid packet
1 Canteen	1 Spoon
1 Canteen cover	1 Cartridge belt, calibre .30, model 1910
1 Can bacon	1 Boot, rifle
1 Condiment can	1 Mask, gas, French
1 Cartridge belt, calibre .30	1 Mask, gas, British, respirator
1 Cup	1 Helmet, trench
1 Fork	

For truckmasters and mechanics:

1 Automatic pistol, calibre .45, model 1911	1 Knife
2 Magazines, pistol, extra	1 Meat can
21 Cartridges, ball, pistol	1 Pack carrier
1 Canteen and cover	1 Pouch for first-aid packet
1 Can bacon	1 Spoon
1 Condiment can	1 Pistol holster, calibre .45 automatic
1 Cup	1 Pistol belt, without saber ring
1 Fork	1 Mask, gas, French
1 Haversack	1 Mask, gas, British, respirator
	1 Helmet, trench

Medical Property

1 First-aid Packet

Quartermaster Property

- 1 Bag, barracks
- 1 Bed sack
- 3 Blankets (add 1 for winter)
- Clothing (as prescribed)
- 1 Goggles
- 1 Overcoat
- 1 Slicker
- 1 Tent, shelter half mounted
- 1 Leather vest for motorcycle driver

Miscellaneous

Lieutenant will carry:

- 1 Case for maps and papers (canvas)
- 1 Compass
- 1 Whistle

Truckmaster will carry:

- 1 Case for maps and papers
- 1 Compass
- 1 Whistle

Asst. Truckmaster will carry:

- 1 Map of areas
- 1 Compass
- 1 Whistle

Messenger will carry:

- 1 Case for papers

Mess Truck Equipment

- | | |
|--|-----------------|
| 2 Axles and helves | 1 Corkscrew |
| 2 Brushes, scrubbing | 1 Fryer, wire |
| 2 Buckets, G. I. | 2 Hatchets |
| 1 Box, bread | 1 Opener, can |
| 1 Board, bread | 10 Soap, pounds |
| 1 Can G. I., 15 gal. | 1 Stone, whet |
| 4 Cans, 5 gal. heavy metal | 4 Towels |
| 1 Field range No. 1, complete with all accessories | |

Clothing is obtained by requisition on Q. M. C. Form No. 213, Requisition for Clothing in Bulk. (Form to be exhibited and explained.)

Any property provided by regulations and the Table of Fundamental Allowances in the case of companies or larger organizations can be secured from the supply officer who obtains it from the Quartermaster on Q. M. C. Form No. 160 or from the Ordnance Officer without requisition.

Articles of individual equipment are charged to the man on Form No. 637 A. G. O. as previously covered under "Accountability" and "Responsibility."

Ordnance property is invoiced to the supply officer on Form No. 600 A. G. O. He issues the ordnance property to the companies on memorandum receipt.

A similar procedure would be followed by the supply officer in obtaining and issuing signal and engineer property.

Extract from G. O. 11 W. D. 1918:

"Company and detachment commanders will be held responsible by their superiors that their men are at all times properly clothed and supplied with all articles of the individual mess equipment, and that responsibilities for loss and damage are promptly determined."

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE IX

REQUISITION FOR STATIONERY

REQUISITION FOR FUEL AND BEDDING

SURVEYS

REPORT OF SURVEYS

MANUAL OF COURTS-MARTIAL

REQUISITION FOR STATIONERY—Q.M.C. FORM 204

Office stationery includes typewriting supplies, writing and blotting paper, pens and pen-holders, ink, mucilage, sealing wax, office tape, envelopes, and lead pencils.

To each office desk the following is allowed:

- 1 Inkstand.
- 1 Paper folder.
- 1 Ruler.
- 1 Steel eraser.
- 1 Piece of India rubber.

Requisition for these items will be prepared by the company clerk on Q.M.C. Form No. 204 and submitted to the company commander for his signature, which certifies that these supplies are needed by him to equip his organization. It is then delivered to the sergeant-major who will have it approved by the next higher commander. It is then filled and the articles issued are receipted for in the space provided for that purpose by the company commander.

REQUISITION FOR BLANK FORMS

The company clerk should also prepare a requisition for blank forms that will be needed in the proper running of a company. These forms are listed below. The requisition should include those listed as being needed for immediate use; the other forms will eventually be needed and should be requisitioned when the proper quantities have been ascertained.

Forms for immediate use:

- | | |
|-------------|--------------------------------|
| A.G.O. 29, | Service Record. |
| A.G.O. 95, | Descriptive list of deserters. |
| A.G.O. 332, | Morning Report. |
| A.G.O. 339, | Daily Sick Report. |
| A.G.O. 342, | Duty Roster. |
| A.G.O. 637, | Individual Equipment Record. |

A.G.O. 644,	Pay Cards.
Q.M.C. 176,	Requisition for Corn Brooms, Scrubbing Brushes, etc.
Q.M.C. 180,	Abstract of Clothing Drawn (or issued).
Q.M.C. 204,	Requisition for Stationery.
Q.M.C. 211a,	Requisition for Fuel and Bedding.
Q.M.C. 213,	Requisition for Clothing (in bulk).
Q.M.C. 223,	Ration Return.
Q.M.C. 452,	Company Council Book.
Ord. 386,	Requisition for Ordnance and Ordnance Stores.
	Correspondence Book.
T.D.2A,	Application for Insurance. (W.R.I.)
T.D.1B,	Allotment Blank.
	All such local forms as are prescribed by local orders.

Forms to be requisitioned before the end of the month:

A.G.O. 3,	Notification Discharge.
A.G.O. 26,	Field Return.
A.G.O. 30,	Return of Troop, Battery or Company.
A.G.O. 34,	Inventory of Effects of a Soldier.
A.G.O. 66,	Furlough.
A.G.O. 149,	Return of Casualties in Action.
A.G.O. 196,	Report of Survey.
A.G.O. 383,	Requisition for Books and Blank Forms from A.G.O.
A.G.O. 415,	Report of Death and Disposal of Remains.
A.G.O. 448,	Memorandum Receipt.
A.G.O. 448b,	Abstract of Memorandum Receipts.
A.G.O. 525,	Honorable Discharge.
A.G.O. 526,	Discharge from U. S. Army.
A.G.O. 527,	Dishonorable Discharge.
A.G.O. 594,	Charge Sheet.
A.G.O. 600,	Combination Invoice and Receipt.
A.G.O. 602,	Statement of Charges Against Enlisted Men.
W.D. 370,	Final Statement.
Q.M.C. 8a,	Advice of Soldiers' Deposits.
Q.M.C. 38,	Soldier's Allotment.
Q.M.C. 39,	Discontinuance of Soldier's Allotment.
Q.M.C. 41,	Soldier's Deposit Book.
Q.M.C. 207a,	Certificate of Breakage, China and Glassware.
Q.M.C. 208,	Statement of Charges.
Q.M.C. 406,	Official Telegrams.

REQUISITION FOR FUEL AND BEDDING. Q.M.C. FORM 211A.

When in the field, the fuel needed for cooking, heating, kitchen pits, incinerators, etc., and bedding for men of a regiment or lesser organization is requisitioned on Form No. 211a Q.M.C. Provision is made for showing the number of messes and days for which the fuel is required, quantity of wood (or other authorized fuel) required, and for what purpose, quantity and kind of bedding and the number of organizations and men. The requisition is prepared by the quartermaster of the regiment or lesser unit and submitted in duplicate to the camp quartermaster or the quartermaster of the base depot. The original, after being posted to the property account, is forwarded to the Quartermaster General of the Army and the duplicate filed with the retained papers of the issuing quartermaster. Issues in excess of the authorized allowances must be approved by the department commander or the commanding general in the field.

SURVEYS—REPORT OF SURVEYS

Public property which has been damaged, except by fair wear and tear, or is unsuitable for the service, before being submitted to an inspector for condemnation will be surveyed by a disinterested officer, preferably the summary court officer.

The surveying officer is designated by the commanding officer of the regiment, separate battalion, post or station, from the field officers of his command whenever practicable. Such officer may, however, be appointed by the commanding officer of a department, field army, division, brigade or district. The surveying officer, however, need not be a field officer.

A tabulated list showing the quantity and designation of the articles to be surveyed, together with a statement of the date and circumstances attending the loss, damage or destruction of these articles, will be made out on Form No. 196 A. G. O.—Report of Survey, and signed by some officer who takes oath before a summary court officer or any other officer authorized to administer an oath, that these articles of public property were lost, destroyed or damaged in the manner stated while in the public service.

The responsible officer certifies over his signature that the loss, destruction, damage or unserviceability of the articles named was occasioned by unavoidable causes and without fault or neglect on his part, and that each article listed with a view to elimination by destruction has been examined by him personally, has never been previously condemned, has become unserviceable in the manner stated, and is, in his opinion, worthless for further public use.

The report of survey must be prepared in triplicate. The three copies are then forwarded to the commanding officer who appoints a surveying officer and has his adjutant indorse the three copies to the officer appointed.

The surveying officer should examine all available testimony in the case, interview available witnesses, and make his report which is rendered in the space provided on the report of survey. He also renders his recommendations in the space provided, which must be in accordance with the provisions of Army Regulations.

The procedure in surveys of property and in rendering reports of survey is covered by Army Regulations, Paragraphs 710 to 726, inclusive, and in the printed instructions on the Report of Survey Form 196 A. G. O., both of which should be carefully consulted by the officer before making the survey and rendering the report.

COURTS-MARTIAL

Instructor will read from the Manual for Courts-Martial—Chapters 9, 10 and 11 to Page 98, inclusive, covering—

Arraignment of the Accused.

Pleas.

Refusal to Plead.

Motions.

Attendance of Witnesses, both Military and Civilian.

Depositions.

Fees, Mileage and Expenses of Witnesses.

General Provisions regarding Evidence.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE X

DISCHARGES—HONORABLE, DISHONORABLE, PLAIN

FINAL STATEMENTS

MONTHLY REPORTS

DISCHARGES

"An enlisted man will not be discharged before the expiration of his term of service except—

1. By order of the President or the Secretary of War.
2. By sentence of a general court-martial or military commission.
3. By direction of the Commander of a territorial department of mobilized division; on account of disability; on account of a sentence to imprisonment by a Civil Court, whether suspended or not; or under the provisions of paragraph 126 A. R.
4. In compliance with an order of one of the United States Courts, or a justice or a judge thereof, on a writ of habeas corpus." (Par 139 A. R.)

Kinds of Discharge

There are three different classes of discharge certificates:

1. The Honorable Discharge (A. G. O. No. 525, printed on white paper) is given when the soldier's service has been honest and faithful and he is entitled to re-enlistment in the service.
2. The Dishonorable Discharge (A.G.O. Form 527, printed on yellow paper) is given when the soldier is dishonorably discharged by sentence of a court-martial.
3. The Discharge (A.G.O. Form No. 526) printed on blue paper, is given when the soldier is discharged under conditions which do not warrant his retention in the service.

Honorable Discharge

An honorable discharge does not mean merely that a soldier has been brave in the presence of danger and death, but has a much wider scope. The honorable discharge is a statement that the soldier has been during the period of his enlistment, a man of high character. It is a testimonial that he has distinguished himself while in the service as a soldier; has always conducted himself both in and out of line of duty as a man and a soldier should; that he has been a man of integrity, loyalty, efficiency, trustworthiness, and dependability under any and all circumstances and at all times.

Dishonorable Discharge

A Dishonorable Discharge is a summary dismissal from the Army after due procedure by court-martial or military commission.

Discharge

A discharge, without honor or dishonor, is given an enlisted man when for any reason he becomes incapacitated by reason of past infirmity or sickness. A discharge involves the making out of a Surgeon's Certificate of Disability which certifies that the soldier is not able to perform his duties. Under the old regulation in force before the war, an enlisted man who was inapt or gave evidence of habits which served to render his retention in the service undesirable, was given a discharge, without much investigation. During the present emergency, however, an effort is being made to fit every soldier into some part of our war machine. A man is given a discharge for disability, only on the recommendation of a board of physicians which has carefully examined the case.

The distinction that exists between honorable and dishonorable discharges and discharges should be borne in mind. A *discharge* is without honor or dishonor—it is merely a discharge.

All cases of disability or incapacity do not warrant a mere discharge; for example, if a soldier has been wounded or contracts disease in line of duty, which incapacitates him for further service, after due procedure as above stated he would be given an *honorable discharge*.

When a soldier is to be discharged the company commander causes the appropriate discharge certificate and final statement to be prepared. The discharge certificate is submitted to the regimental or other appropriate commanding officer for his signature and is then returned to the company, where it is given to the man, together with his final statement.

Surgeon's Certificate of Disability. (See A.R. 159-161.)

"A Surgeon's Certificate of Disability for Discharge" is made out on Form No. 17, A. G. O. When a Company Commander has a soldier who is not fit for military service, he fills out page 1 of the form above indicated, recommending a discharge. The information given by the company commander covers the following:

1. Nature of disability.
2. When disability arose.
3. Cause of disability.
4. Whether disability was or was not incurred in line of duty.

If the soldier's commander does not have personal knowledge of the information to be given, he should secure affidavits of those who do. A copy of each affidavit secured is appended to the certificate of disability. If no information is obtainable, that fact is stated.

Following this action by the company commander, the case is submitted to the commanding officer of the regiment or post who in turn calls upon a board of medical officers to examine the soldier. The channels through which the certificate goes when the examining board recommends a discharge is carefully covered by instructions on the form itself which reads as follows:

"1. If the board recommends the discharge of the soldier, the post or regimental commander will forward the certificate of disability with his recommendations thereon to the department or division commander.

"2. The certificate, after having received the action of the department or division commander, will be returned to the post or regimental commander, who will, if the discharge is authorized, sign the soldier's discharge certificate, see that he is furnished with final statements in duplicate, and forward this certificate of disability directly to the Adjutant General of the Army. He will also inform the surgeon of the discharge, as provided in paragraph 160, Army Regulations 1913.

"3. This certificate will not, under any circumstances, be given into the hands of the soldier.

"4. In case of an insane soldier the certificate of discharge will be prepared in duplicate and will be accompanied by the reports and papers required by paragraphs 465-470 Army Regulations, 1913."

FINAL STATEMENTS

A "Final Statement" W. D. Form 370, is the statement of an enlisted man's account with the Government at the time of his separation from the service by death, discharge, or furlough to the Reserve.

Final statement, in duplicate, properly certified to by his immediate commander, will be given with the discharge certificate to every soldier upon his discharge from active service (except as otherwise prescribed by Army Regulations) or with the reservist's descriptive card upon furlough to the reserve, and will be presented to the quartermaster for the pay due him. The payment made will be noted on the discharge certificate or upon the reservist's descriptive card except when the final statement has been transferred.

When an enlisted man is discharged, his company commander will furnish him with a final statement in duplicate or a full statement in writing stating why such final statement was not furnished.

Letter of notification—Notification of discharge or furlough to the reserve will be furnished only in case of an enlisted man who is discharged from active service or furloughed to the reserve at a place at which there is available no officer provided with funds to make payment on final statement. In these cases the officer who prepares the final statement will, at least one week before the discharge or furlough takes effect, send by mail to the quartermaster who is to pay the account a notification of discharge or furlough, stating therein, in his own handwriting, the date of last payment to the soldier, and his credits and debits, both in words and figures, and other data essential for proper payment or identification. The officer will require the soldier to affix his signature to the notification, or if he can not write his name, such fact will be stated thereon.

Blank forms for this notification will be supplied by the Adjutant General of the Army. The officer issuing the final statement will inform the soldier of the location of the quartermaster to whom he shall apply for payment.

Note:—Introduce Form No. 370 W. D. in class.

The final statement shows the date and place of enlistment, whether discharged or furloughed to the reserve, retired, or died, and, if discharged, whether honorably or otherwise and reasons therefor. It shows date of last payment, amounts due the soldier for pay and accumulated interest thereon, if any; additional pay, if any; commutation of light, heat and quarters, if any; balance due soldier for clothing, if any; and for deposits and travel pay, if soldier is entitled to same. It also shows the amounts due the U. S. for stoppages, etc., and the amounts due the Post Exchange.

It is *absolutely not permissible* to prepare final statements on a typewriter. Erasures, interlineation, etc., on a final statement which affect the settlement thereof will not be accepted by the paying quartermaster unless satisfactorily explained by the organization commander.

Money amounts in all cases, except in the case of the List of Deposits, filled out by the organization commander and the statement on the outer last fold, filled in by the paying quartermaster, are written out in full, the writing to commence close to printed matter on left-hand side, and are also expressed in figures enclosed in parentheses immediately following the written words.

Travel Allowances—Enlisted men when entitled to travel allowances upon discharge from active service or upon furlough to the reserve are entitled to same from place of discharge or furlough to place of acceptance for enlistment, regardless of place at which actually enlisted. The place of actual enlistment, if different from the place of acceptance, will in no case be considered in determining the travel allowances due.

Those not entitled to travel pay are those discharged on account of fraudulent enlistment; those discharged without honor on account of desertion; those who conceal their minority at time of enlistment; those who accept a commission; those tried and convicted by the civil authorities.

Additional Pay—In the space for additional pay, notation will be made of pay due the soldier for certificate of merit, on account of marksmanship qualifications, by reason of appointment as mess sergeant, etc.

Pay detained pursuant to sentence of court-martial will be detained by the Government until the soldier is discharged from active service or furloughed to the reserve, at which time the total amount detained, if not forfeited, will be noted on the final statement in the space provided therefor, and paid to him out of Pay of the Army for the fiscal year in which discharged or furloughed.

When an enlisted man, who is discharged, is entitled to commutation of light, heat and quarters, he will prepare W. D. Form 369 for these allowances. This voucher will be filed as a sub-voucher to the final statement.

The final statement of an enlisted man who is entitled to commutation of quarters, heat, and light will show in the space provided therefor the inclusive dates for which such allowances are due.

Notation of stoppages—Under the heading, "Due United States" will be noted all authorized stoppages for loss or damage to Government property or supplies, the stoppages being made under the proper headings, e. g., "Clothing," "C&GE," "RS," "Transportation," "Ordnance," etc., the names of the articles damaged, lost, or destroyed not being stated; amounts due on account of allotments, post exchange, post laundry, tailor, company fund, or transportation; and stoppages under sentence of court-martial, showing nature and date of court-martial or date of order approving sentence, and the forfeiture as expressed in the sentence, e. g., "To forfeit two-thirds of his pay per mo. for 2 mos. SC Oct. 5-18." If any part of the forfeiture has been deducted, the amount and pay roll on which deducted will be stated.

Notation will be made of all allotments and War Risk Insurance premiums with the amounts due on same, such amounts being figured to and including the date of discharge, except that when the discharge takes place on any but the last day of a month, no entry or deduction will be made of insurance premium for that month.

When such are the facts, the following entry should be made under "Remarks":

"Service honest and faithful. No AWOL, nor absence under G. O. 31 W. D. 1912, or G. O. 45 W. D. 1914. Entitled to travel pay."

Transfer of Final Statement—A transfer of the amount due a soldier on a final statement will be recognized only when made after discharge from active service or after being furloughed to the reserve. The transfer must be indorsed in writing on the final statement, signed by the soldier, and witnessed by a commissioned officer or some other reputable person known to the quartermaster.

Final Statement of Deceased Soldier—In the case of deceased soldiers, only one copy of the final statement and duplicate inventories of effects will be prepared and forwarded as soon as practicable to the Adjutant General of the Army. Nothing will be entered on the final statement regarding the cause of death or whether same occurred in line of duty or not, or whether same was due to the soldier's own misconduct. A separate statement containing this information will be prepared and forwarded with the final statement.

Responsibility of Certifying Officer—Officers signing and certifying to the correctness of final statements will be held responsible for their accurate preparation and also for disregard of plain instructions as made known through Army Regulations, orders, and notes on the blank forms. Officers responsible for overpayment on erroneous final statements will be required to refund the amounts overpaid if it is found impracticable to make collection from the party overpaid.

Officers signing final statements will be careful to see that in the space for "Remarks" notations relative to the cause for discharge determine whether or not the soldier is entitled to travel pay.

MOTOR TRANSPORT CORPS**EXECUTIVE DIVISION—TRAINING BRANCH****Motor Truck Officers' Course****ADMINISTRATION****LECTURE XI****MONTHLY RETURNS****PERSONNEL REPORT****COMMUTATION OF RATIONS AND LODGING FOR DRIVERS M.T.C.****DAILY RECEIPTS AND ISSUES OF GASOLINE, ETC.****MANUAL COURTS-MARTIAL (EVIDENCE)****MONTHLY RETURNS**

Form M.T.C. 143 is a report of the condition of the organization at midnight on the last day of the month. It is sent on the first day of each month by every commanding officer of a unit, company or detachment direct to the Chief of the Motor Transport. It is made in duplicate and one copy is kept for file.

Form A. G. O. 30 is a similar report that is filled out on the first day of each month by every officer commanding a company or detachment, who will send a copy of this return to regimental headquarters, and every officer commanding a company or detachment not forming a part of a train will send a copy to the Adjutant General of the Army. The return will be made out in duplicate and one copy retained. The retained copy will, if necessary, be loaned to post headquarters for the preparation of the post return. The making of carbon copies is authorized, but they must be clear and distinct, and the original must be the one forwarded.

PERSONNEL REPORT

M. T. C. Form 130. This report is used only in case of enlisted men in M. T. C. It is to be made out in duplicate, the original to be forwarded to the Chief of Motor Transport.

COMMUTATION OF RATIONS AND LODGING FOR DRIVERS

Form M. T. C. 120a is to be used as a voucher for the payment of commutation of rations and lodging for soldiers traveling under special orders, specifically directing the soldier's travel either with or without officers. Upon completion of the trip it will be certified to by an officer, in accordance with the printed directions on the inside of the cover. The original and one carbon copy are to be given to the soldier for presentation to the disbursing officer in order that the soldier may be paid the commutation due him. The third copy is forwarded to the commanding officer of the organization to which the soldier is assigned for rations.

Form M. T. C. 120b is used for commutation of rations and lodging for a soldier traveling as driver for an officer, in case the travel performed by the soldier is not specifically covered by the order directing the travel of the officer or vehicle. This form is to be filled out and certified to as per directions printed inside the cover. The disposition of the copies is the same as in Form 120a.

DAILY RECEIPTS AND ISSUES OF GASOLINE, LUBRICANTS, ETC.

M. T. C. Form 117. On this form is kept a daily record of gasoline and supplies received and issued by a company. It is to be kept by the supply sergeant and turned in to the organization office at the end of each day, and the information contained therein is embodied in the weekly report made by the commanding officer to the Chief of Motor Transport, which latter report is made on Form M. T. C. 118.

MANUAL COURTS-MARTIAL (EVIDENCE)

Instructor will read from Manual of Courts-Martial from Page 99 to page 138, inclusive, covering—

Circumstantial Evidence.

Testimonial Evidence.

Documents.

Examination of Witnesses.

Depositions and Former Testimony.

Presumptions.

Judicial Notice.

Note to instructor:

The subject covered above is of extreme importance and the utmost care should be taken to see that it is thoroughly understood.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE XII

STOLEN PROPERTY

DRIVER'S ACCIDENT REPORT

INVESTIGATING OFFICER'S REPORT ON ACCIDENT

CASUALTY RETURNS

MEMORANDUM RECEIPTS

MANUAL OF COURTS-MARTIAL—CHAPTERS XII TO XV

STOLEN PROPERTY REPORT

M.T.C. Form 111. A report will be made out in the case of any article of M. T. C. property which has been stolen. Four copies will be made, the disposition being as follows: Original and second copy forwarded to Headquarters, Motor Transport Corps; the third copy to be turned over immediately to the Assistant Provost Marshal of the territory in which the property was stolen; the fourth copy to be retained as a record for the company. This record must be filled out and mailed promptly.

A. R. Pars. 689-692 give further information regarding stolen property.

DRIVER'S ACCIDENT REPORT

Form M. T. C. 124 is filled out by the driver immediately after any accident which results in injury of persons or property. It is then delivered to the commanding officer of his organization, who will certify on the form the day and hour of receiving report. The form must be supplied to each driver so that he may be in a position to make the report in proper form in case of injury, however slight, caused by his vehicle to persons, animals or property. This form serves as the driver's written report of the accident.

INVESTIGATING OFFICER'S REPORT ON ACCIDENT

Form M. T. C. 125. The commanding officer of a motor transport company will immediately, upon receipt of a report of accident or collision of a vehicle in his organization, proceed to the place of accident, make report of it on M. T. C. Form 125. The report calls for a complete description of all details of the accident, space being provided for the statements of witnesses if practicable. Upon completion of his investigation two copies of the report will be forwarded to immediate headquarters and thence to the officer exercising general courts-martial jurisdiction over the driver. The form is self-explanatory.

particular Section; by the several officers in charge of the motor transportation at General Headquarters, A.E.F.; Headquarters S.O.S.; Paris, and of the motor transportation at the various Headquarters, Depots, Schools, Garages and other establishments in the S.O.S. in all cases where the number of vehicles is sufficient to require a record of this sort to be kept in order to be able to furnish readily a list of said vehicles by types, as indicated in descriptive bulletins issued by Director Motor Transport Corps. The question of the necessity for keeping such files at any particular establishment should be referred to the M.T.O., of the section in which the establishment is located for determination.

These cards will be completed in duplicate by all officers charged with the initial registration of motor vehicles. One copy of completed card will be retained by the officer making the registration (in connection with his records), the other copy, if A.E.F., will be forwarded to the Director Motor Transport Corps, A.P.O. 717, France; if domestic, Washington, D. C. In this office these cards will be divided according to types (as 1, 2, 3, etc.), and filed in numerical order according to the U. S. Registration numbers; and at the head of each type file will be kept a current summary of the total contents of that file. In addition there is, in this office only, a system of filing by Motor and manufacturers' serial number, but this system will not be used in any other office. In other offices, where a file of registration cards is required to be kept, the system to be followed will be the same as that used in the office of the D.M.T.C. (with the exception given above). In the case of these other offices, however, the registration card is to be made out by the office concerned from data obtained from M.T.C. Form No. 101 and from data obtained from reports which may be called as required. Where additional data is required concerning any vehicle, this may be obtained by addressing a communication, if A.E.F., to the Director Motor Transport Corps, A.P.O. 717, France; if domestic, Washington, D. C., requesting the desired information. Such requests should contain as complete description as possible of the vehicle (as for example, Automobile, Dodge, Motor No., Chassis No., etc.).

M.T.C. Form No. 139a is in white, M.T.C. Form No. 139b, yellow, and M.T.C. Form No. 139c, pink. Space is provided to show the U. S. number, model, capacity, make, etc., also make of tires and how mounted.

REGISTRATION CARD FOR CRATED VEHICLES

M.T.C. FORM NO. 122

This is a pink card and is used in shipping crated vehicles when it is impracticable to stencil the U. S. number on the vehicle. The officer who registers the vehicle will enter the U. S. number on the card. Card will then be attached to vehicle, inside the crate, in a place where it will not be defaced.

The officer who receives the vehicle will stencil the U. S. number on vehicle, according to instructions on reverse side, enter motor number and name of organization receiving the vehicle, then mail card, if A.E.F., to the Director Motor Transport Corps, Hq. S.O.S., A.P.O. No. 717, France; and if domestic, to Washington, D. C. Use white paint for stenciling number on vehicle.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

TYPICAL QUIZ QUESTIONS

Typical quiz and examination questions on the preceding lectures of the course.

1. What period does the ration return cover?
2. What purpose does it serve?
3. a. Distinguish between the general and mess fund.
b. For what purpose may each be used?
4. What is the Company Council Book?
5. Name the kinds of military jurisdictions.
6. Name the kinds of courts-martial and give the number of men required to sit upon each.
7. Give the jurisdiction of a general court-martial.
8. Give the limits or punishment of a summary court-martial.
9. Distinguish between accountability and responsibility.
10. What is Equipment C?
11. Distinguish between arrest and confinement.
12. Give the duties of the judge advocate in a court-martial.
13. What is individual equipment record Form A.G.O. 637?
14. What items does requisition for fuel and bedding Q.M.C. 211-A cover?
15. Tell all you know about report of survey.
16. What is a plea abatement?
17. How is the attendance of a witness in a court-martial secured?
18. Name the kinds of discharges.
19. Give the data contained in the final statement W. D. Form 37.
20. Describe Form MTC-143 monthly return.
21. Distinguish between circumstantial and testimonial evidence.
22. What is a judicial presumption?
23. Describe Form MTC 101.
24. What is the War Department policy regarding punishment?
25. Describe the Motor Transport Order Form MTC-116.

particular Section; by the several officers in charge of the motor transportation at General Headquarters, A.E.F.; Headquarters S.O.S.; Paris, and of the motor transportation at the various Headquarters, Depots Schools, Garages and other establishments in the S.O.S. in all cases where the number of vehicles is sufficient to require a record of this sort to be kept in order to be able to furnish readily a list of said vehicles by types, as indicated in descriptive bulletins issued by Director Motor Transport Corps. The question of the necessity for keeping such files at any particular establishment should be referred to the M.T.O., of the section in which the establishment is located for determination.

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EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE XIV

WEEKLY REPORT

FORMS & BOOKS USED IN M.T.C. COMPANY

MANUAL OF COURTS-MARTIAL, CHAP. XVIII

WEEKLY REPORT

M.T.C. FORM No. 118

Information to be entered on this report is of extreme importance to the M.T.C. and includes the unit or U. S. number; the make, type, cargo capacity in tons; condition, consumption gasoline and oil and mileage of all motor vehicles of the organizations.

Detailed explicit instructions are printed on each form. The report is made out in duplicate by the company commander, who retains one copy and sends the other to his immediate superior.

The instructor should spend a full hour at least upon this form. It is one of the most important forms of the M. T. C. and every officer must thoroughly understand it. An exercise in filling it out should be given.

FORMS AND BOOKS USED IN AN M.T.C. COMPANY

Form No.	Q. M. Forms Designation	Allowance for 3 Months
	Pay-Card	
W.D., Q.M.C. 370	Final Statement	12
Q.M.C. 165	Individual Clothing Slips	200
Q.M.C. 223	Ration Return	1 book
Q.M.C. 452	Council Book	1 book
Q.M.C. 160	Requisition	50
Q.M.C. 160a	Requisition	50
Q.M.C. 509	Delinquency Record	100
Q.M.C. 41	Soldier's Deposit Book	12
Q.M.C. 213	Requisition for Clothing (In Bulk)	12
	A. G. O. Forms Designation	Allowance for 3 Months
A.G.O. 30	Return of Troops, Company or Detachment	12
A.G.O. 594	Records of Courts-Martial	48

A.G.O.	332	Morning Report	3
A.G.O.	339	Daily Sick Report	2 books
A.G.O.	342	Duty Roster	3 books
A.G.O.	149 SDAEF 4	Report of Casualties and Changes	144
A.G.O.	169	Report of Survey	36
A.G.O.	29	Service Record	1 for each man
A.G.O.	525	Honorable Discharge	12
		Correspondence Book	1
A.G.O.	637	Individual Equipment Record	200
		M. T. C. Forms	Allowance for
		Designation	3 Months
M.T.C.	118	Weekly Report	60
M.T.C.	117	Daily Receipts and Issues of Gasoline, Lubricants, etc	100
M.T.C.	116	Motor Transport Order	144
M.T.C.	120a	Commutation of Rations and Lodgings for Drivers	6 books
M.T.C.	120b		
M.T.C.	124	Driver's Accident Report	24
M.T.C.	125	Investigating Officer's Report on Accidents	24
M.T.C.	143	Monthly Return	9
M.T.C.	130	Personnel Report for Enlisted Men	12
M.T.C.	101	Memorandum Receipts	24
M.T.C.	111	Stolen Property Report	12

BOOKS AND REFERENCES

It is suggested that Motor Transport Corps officers procure the following books, and constantly refer to them in the field. Some of them may be had on application to the A.G.O. while others will have to be purchased.

1. Army Regulations.
2. M.T.C. Manual.
3. M.T.C. Field Service Regulations.
4. Infantry Drill Regulations.
5. Manual for Q.M. Corps.
6. Manual for Courts-Martial.
7. Manual for Army Cooks.
8. Manual for Physical Training.
9. A Standard Hand-Book of Motor Vehicles.
10. French-English Dictionary.
11. Catalogues, Manufacturers' Instruction Books for Cars Operated by the Company.
12. Maps of the Territory Served by the Company.
13. Copies of all General Orders, Bulletins, or Circulars Issued by the Various Headquarters the Company is Serving.
14. Good Loose-Leaf Memorandum Book.

MANUAL FOR COURTS-MARTIAL

CHAP. XVIII

The instructor will read from the Manual for Courts-Martial covering Courts of Inquiry, action by appointing or superior authority, action on the proceedings, action after promulgation of sentence, showing therein:

Jurisdiction.
Composition.
Powers.
Procedure.
Records.
Habeas Corpus.
Purpose of the writ.
Where restraint is by the U. S.
Return to writ issued by State Court.
Writ issued in the Philippine Islands.
Miscellaneous provisions.
Transitory provisions.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

LECTURE XV

CUSTOMS OF THE SERVICE

MILITARY COURTESIES

DISCIPLINE

MANUAL FOR COURTS-MARTIAL—CHAP. XVII

PROBLEM IN DRAWING CHARGES

"Customs of the Service" are sometimes called common law of the Army. Signifies generally a right or law not written, but established by long usage. To render a custom valid it is said the following qualities are requisite: 1, habitual or long-established practice; 2, continuance without interruption; 3, without dispute; 4, it must be reasonable; 5, certain; 6, compulsory; 7, customs must be consistent with each other. It may be said that the common law of the Army derives its force from the tacit consent of those in the service. General Kautz states that officers of the Army have certain duties to perform that are governed by certain laws, rules and regulations, which are interpreted and executed in a certain way, called "Customs of the Service." A knowledge of these rules of the service, and their application, constitutes the military profession, and is the true art of war. To this extent it is an exact science, and may be acquired by application and experience.

General. The military establishment of the United States is governed in its administration and intercourse within and without the service by rules derived from three sources, viz: First, the statutes enacted by Congress, which permit of no deviation. Second, the Army Regulations, which have the force of law; they are promulgated by the Secretary of War and may be amended, suspended or abrogated by the same power, and in cases of emergency may be neglected by independent commanders subject to subsequent approval. Third, by the subtle though no less forceful and binding code included in "Customs of the Service"—a code which governs in cases where law and regulations are silent and which can only be modified by drastic action or through the slow process of a change of sentiment. So powerful is "custom" that it receives legal recognition in the 19th Article of War.*

The statute laws and the regulations are published and are so available that a knowledge of them may be acquired by any student. With the "Customs of the Service" it is different. To acquire a knowledge of them requires long association with the military establishment and usually involves many embarrassments and chagrins. For instance, how natural it would be for an inexperienced

*The oath administered to members of a court-martial

rienced officer to avail himself of the shelter of an umbrella, but how mortifying to receive the jibes of his comrades and the reprimand of his commanding officer—yet against the use of the umbrella by soldiers in uniform there is nothing but “custom.”

Likewise, if a commanding officer should say to one of his officers, “I desire that you do so and so,” or “I wish that you do so and so,” and should the officer fail or refuse to do “so and so,” he would be found by a court-martial as guilty of a breach of discipline as if the commanding officer had said, “I hereby order that you do so and so.”

Well might an imposter succeed in passing for a member of the Army if only law and regulations were to be considered. But at every turn he would reveal to the experienced ones his fraud through the constant transgression of those subtle laws described by the comprehensive though hazy term, “Customs of the Service”—a code of laws so unconsciously learned and practiced that their existence is scarcely observed and of such remote antiquity that their origin is frequently lost in the misty dawn of war’s beginning.

Customs of the service are of two kinds, official and social, and sometimes it is not easy to differentiate between the two.

The following compilation of customs of the service, gathered from various sources, is the result of a sincere and faithful effort to cover the ground in a complete and accurate manner:

Calling aboard ship. Sailors approach and board vessels of war by the port (left) side and gangway; officers of the Army and Militia approach and board vessels of war by the starboard (right) side and gangway. Upon boarding a ship one is received by the Officer of the Deck, or some one else. Ask the officer who receives you for the person you wish to see and your card will be sent or you will be shown down.

If your call is made as a welcome to the port, either from your post, your mess or personally, it would be polite and proper to call on the captain as well as on the officers’ mess. However, if your call is a personal one on a friend, then you are not expected to call on the captain or anyone else.

Titles. 1. When not on duty a lieutenant is addressed as “Mister,” but when on duty, especially with troops, the title “Lieutenant” is *usually* used. Enlisted men always address lieutenants as “Lieutenant.” Some officers follow the custom of using the military title when introducing lieutenants. Thus, for example, “I should like to present to you Lieutenant Smith, of the Army,” thereby fixing the official identity and status of the officer. However, after the introduction the title “Mister” would be used.

2. When off duty older officers sometimes address juniors as “Smith,” “Jones,” etc., but this does not give the junior the privilege of addressing his senior in any other way than by his proper title. In this connection it may be added a certain amount of familiarity is necessary between seniors and juniors in social intercourse, but young officers should be exceedingly careful not to be “fresh” with their superiors just because the latter, in order to make post life harmonious and agreeable, adapt themselves to amusements engaged in by the former, or address them by their surnames.

3. Officers with the grade of captain and above are addressed as “Captain,” “Major,” etc., although one sometimes hears the wives of such officers who married them when they were lieutenants refer to them, especially in conversation with friends, as “Mister Jones,” etc.

4. In conversations and in non-official correspondence, brigadier generals, major generals, and lieutenant generals are referred to and addressed as

"General." Lieutenant colonels, under the same conditions, are referred to and addressed as "Colonel."

5. Whenever there is a difference in title, except in the case of officers that are intimate and of about the same age or length of service, the junior addresses the senior by his title. Thus lieutenants address captains as "Captain"; captains address majors as "Major," etc. Some captains, irrespective of intimacy or former associations, always address majors as "Major," taking the ground that propriety demands this, because of the decided line of demarcation between the grade of major (field officer) and that of captain.

Officers of the same grade, except where there is considerable difference in age or in date of commission, generally address one another by their surnames.

6. Chaplains are addressed as "Chaplain." Chaplains of the Roman Catholic faith are sometimes addressed as "Father."

7. In speaking to the professors of the U. S. Military Academy, they are always addressed, except by the cadets, as "Colonel." The cadets address the professors as "Professor." In written communications they are addressed, for instance, as "Colonel John A. Smith, U. S. A."

8. Officers dismissed from the service are addressed as "Mister," and never by their former titles.

The general rule that when a man has once been entitled to a military title he never loses it does not apply in the case of officers dismissed from the service. Such men are cut out of the service in every respect—title and all. To address a dismissed officer by his former military title serves only to remind him of his disgrace.

(NOTE.—When an officer is dismissed from the service for *cowardice* or *fraud*, it is scandalous for an officer to associate with him.—44th Article of War.)

Officers of the Medical Corps of the grade of captain and above are addressed socially by their military title ("Captain," "Major," "Colonel"), although some officers follow the practice of addressing captain surgeons as "Doctor."

Lieutenants of the Medical Corps are addressed as "Doctor."

In addressing surgeons dressed in civilian clothes, and whose branch of the service is, therefore, not recognizable by insignia, some officers use this form of introduction: "I would like to present to you Major Jones, of the Medical Corps."

Noncommissioned officers are addressed as "Sergeant" and "Corporal," while privates, cooks, artificers, buglers, etc., are addressed as "Smith," "Jones," etc.

Lance corporals are addressed as "Corporals." Sergeants major, quartermaster sergeants, commissary sergeants, ordnance sergeants and color sergeants are addressed as "Sergeant."

In speaking of an enlisted man to an officer, a soldier uses the proper title. Thus, "Sergeant Smith," "Corporal Jones," Private Wilson."

The word "soldier," in conversation and in writing, is generally used in contradistinction to the term "officer." Soldiers are usually spoken of as "enlisted men."

Umbrellas. It is considered unmilitary for an officer or a soldier in uniform to use an umbrella. Several years ago the colonel and some of the officers of a certain infantry regiment used umbrellas while in uniform. The regiment was soon jocularly dubbed throughout the service "The —th Umbrellas," and even to this day it is sometimes referred to in this manner.

Folding the Flag.—When the flag is lowered at the sounding of the last note of retreat every day, great care should be taken that it shall not touch the ground.

A junior walks, rides or drives on the left of a senior and in the first case always keeps step with him.

"I desire," "I wish," and similar expressions, when used by the commanding officer, or "The commanding officer desires," etc., when used by the adjutant, are tantamount to orders.

In delivering verbal messages from a senior to a junior, soldiers use the form "Captain Jones presents his compliments to Lieutenant Smith, and says," etc. A junior officer should never "present his compliments" to a senior.

It is customary for troops to be paid under side arms.

Medals and other Insignia are worn on the left breast because it was the shield side of the Crusaders, and furthermore, because it was near the loyal heart that the knight placed his badge of honor and fealty to his king.

MILITARY COURTESIES

Importance. The importance of the subject of military courtesy, especially for the officer just beginning his career, cannot be emphasized too strongly.

The Army Regulations tell us, "Courtesy among military men is indispensable to discipline."

Military Courtesy Not Confined to Official Occasions.—To quote from the Army Regulations, "Respect to superiors will not be confined to obedience on duty, but will be extended on all occasions." In his suggestions to officers, Captain Sargent says: "Officers take precedence according to rank as laid down in the Regulations, and this precedence extends to your social life, to the mess, and to the club. When a senior enters the club, it is just as much an act of official courtesy as it is a social one to offer him a chair and a paper, to defer in a manly way to his rank.

"For the same reason, if you are out drilling your company, never pass across the front of a company commanded by a senior so as to cause him to halt or mark time until you are out of the way. You might be a little in advance of him, and so have what is commonly termed the right of way, but it would be a courteous thing to do if you took a little longer route and avoid delaying him.

"It is not meant that there should be a servility or fawning toward a superior officer,—such a course is detestable; but that there should be deference, which in official intercourse should be marked."

The Nature and Origin of the Military Salute. From time immemorial subordinates have always uncovered before superiors, and equals have always acknowledged each other's presence by some courtesy,—this seems to be one of the natural, nobler instincts of man. It was not so many years ago when a sentinel saluted not only with his gun, but by taking off his hat also. However, when complicated headgear like the bearskin and the helmet came into use, they could not be readily removed and the act of removing the hat was finally conventionalized into the present salute,—into the movement of the hand to the visor as if the hat were going to be removed.

Every once in a while a man is found who has the mistaken idea that he smothers the American spirit of freedom, that he sacrifices his independence, by

saluting his officers. Of course, no one but an anarchist or a man with a small, shrivelled-up mind can have such ideas.

Manly deference to superiors, which in military life is merely recognition of constituted authority, does not imply admission of inferiority any more than respect for law implies cowardice.

The recruit should at once rid himself of the idea that saluting and other forms of military courtesy are un-American. The salute is the soldier's claim from the very highest in the land to instant recognition as a soldier. The raw recruit, by his simple act of saluting, commands like honor from the ranking general of the Army.

While the personal element naturally enters into the salute to a certain extent, when a soldier salutes an officer he is really saluting the office rather than the officer personally,—the salute is rendered as a mark of respect to the rank, the position that the officer holds, to the authority with which he is vested. A man with the true soldiery instinct never misses an opportunity to salute his officers.

As a matter of fact, military courtesy is just simply an application of common, every-day courtesy and common sense. No man with the instincts of a gentleman ever thinks about taking advantage of this thing and that thing in order to avoid paying to his fellow man the ordinary, conventional courtesies of life, and if there is any doubt about the matter, he takes no chances, but extends the courtesy. And this is just exactly what the man who has the instincts of a real soldier does in the case of military courtesy. The thought of "Should I salute or should I not salute" never enters the mind of a soldier just because he happens to be in a wagon or motor-car.

In all armies of the world, all officers and soldiers are required to salute each other whenever they meet or pass, the subordinate saluting first. The salute on the part of the subordinate is not intended in any way as an act of degradation or a mark of inferiority, but is simply a military courtesy that is as binding on the officer as it is on the private, and just as the enlisted man is required to salute the officer first, so is the officer required to salute his superiors first. It is a bond uniting all in a common profession, marking the fact that above them there is an authority that both recognize and obey,—the country. Indeed, by customs and regulations, it is as obligatory for the ranking general of the Army to return the salute of the recruit as it is for the latter to give it.

Let it be remembered that the military salute is a form of greeting that belongs exclusively to the government,—to the soldier, the sailor, the marine,—it is the mark and prerogative of the military man and he should be proud of having the privilege of using that form of salutation,—a form of salutation that marks him as a member of the Profession of Arms,—the profession of Napoleon, Wellington, Grant, Lee, Sherman, Jackson and scores of others of the greatest and most famous men the world has ever known. The military salute is ours, it is ours only. Moreover, it belongs only to the soldier who is in good standing, the prisoner under guard, for instance, not being allowed to salute. Ours is a grand fraternity of men-at-arms, banded together for national defense, for the maintenance of law and order,—we are bound together by the love and respect we bear the flag,—we are pledged to loyalty, to one God, one country,—our lives are dedicated to the defense of our country's flag,—the officer and the private belong to a brotherhood whose regalia is the uniform of the American soldier, and they are known to one another and to all men, by an honored sign and symbol of knighthood that has come down to us from the ages—*The Military Salute!*

WHOM TO SALUTE

General Rule. Day or night, covered or uncovered, whether either or both are in uniform, a subordinate (whether officer or enlisted man) not in military formation, nor at drill, work, games, or mess, salute all superiors whom they meet, pass near, address, or who address them.

Salutes by Detachment and Other Commanders. (a) *When one person is in command of a unit and another is not.* Commanders of detachments or other commands salute officers of grades higher than themselves, first bringing the unit to attention. However, if the person not commanding the unit is of junior or equal grade to the unit commander, then the unit need not be brought to attention. (b) *When both persons are in command of units.* If two detachments or other commands meet, their commanders exchange salutes, both commands being at attention.

Navy and Marine Corps. Soldiers at all times and in all situations salute officers of the Navy and Marine Corps (when in uniform) the same as they salute officers of the Regular Army.

Foreign Naval and Military Officers. The Manual of Interior Guard Duty requires sentinels to salute foreign naval and military officers, but there are no instructions about other enlisted men saluting them. However, as an act of international courtesy, they should be saluted the same as our own officers.

WHEN AND HOW TO SALUTE

Saluting Distance. Saluting distance is that within which recognition is easy. In general, it does not exceed 30 paces.

As to the distance at which the salute should be made, the following is what has been the practice in the Army:

In approaching or passing each other within saluting distance, individuals or bodies of troops exchange salutes when at a distance of about six paces. If they do not approach each other that closely, the salute is exchanged at the point of nearest approach. For instance, if the officer and soldier are approaching each other on the same sidewalk, the hand is brought up to the head-dress when about six paces from the officer. If they are on opposite sides of the street, the hand is brought up when about ten paces in advance of the officer. If the officer and soldier are not going in opposite directions and the officer does not approach within six paces, the salute is rendered when the officer reaches the nearest point to the soldier. If a soldier passes an officer from the rear, the hand is raised as he reaches the officer; if an officer passes a soldier from the rear, the soldier salutes just as the officer is about to pass him.

When Making or Receiving Reports. When making or receiving official reports all officers salute. Military courtesy requires the junior to salute first, but when the salute is introductory to a report made at a military ceremony or formation to the representative of a common superior,—as, for example, to the adjutant, officer of the day, etc.,—the officer making the report, whatever his rank, will salute first; the officer to whom the report is made will acknowledge, by saluting, that he has received and understood the report.

Officer Entering Room Occupied by Soldiers. When an officer enters a room where there are several enlisted men, the word "attention" is given by some one who perceives him, when all rise, uncover, and remain standing at attention until the officer leaves the room or directs otherwise.

At Meals. Enlisted men at meals stop eating and remain seated at attention when an officer enters the room.

When Seated. An enlisted man, if seated, rises on the approach of an officer, faces toward him, stands at attention, and salutes. Standing he faces an officer for the same purpose. If the parties remain in the same place or on the same ground, such compliments need not be repeated.

Soldier Indoors. Indoors, an unarmed enlisted man uncovers and stands at attention upon the approach of an officer. If armed with rifle, he renders the rifle salute at the order or trail.

Officer Approaching Number of Soldiers in Open.—When an officer approaches a number of enlisted men out of doors, the word "attention" should be given by some one who perceives him, when all stand at attention and all salute. It is customary for all to salute at or about the same instant, taking the time from the soldier nearest the officer, and who salutes when the officer is six paces from him.

At Work. Soldiers actually at work do not cease work to salute an officer unless addressed by him.

Riding in Wagon or Motor-Car. A soldier riding in a wagon on motor-car should salute officers that he passes. He would salute without rising. Likewise a soldier driving a wagon should salute, unless both hands are occupied.

Passing Officer on Staircase. It is customary for a soldier who is passed by an officer on a staircase to come to a halt and stand at attention.

Addressing or Being Addressed by an Officer. Before addressing an officer, or when addressed by an officer, an enlisted man makes the prescribed salute with the weapon with which he is armed; or, if unarmed, with the right hand. He also makes the same salute after receiving a reply.

How Salutes are Rendered in Uniform. In uniform, covered or uncovered, but not in formation, officers and enlisted men salute military persons as follows: With arms in hand, the salute prescribed for that arm (sentinels on interior guard duty excepted); without arms, the right hand salute.

Rifle Salute. Enlisted men out of doors and armed with the rifle salute with the piece at the right shoulder; if indoors, the rifle salute is rendered at the order or trail.

Sentinels on Post. A soldier salutes with the "present arms" only when actually on post as a sentinel doing interior guard duty. At all other times when armed with the rifle he salutes with the prescribed rifle salute.

The general rules and principles of saluting apply to sentinels on post duty doing interior guard duty; except, as just stated, they salute by presenting arms when armed with the rifle. However, they do not salute if it interferes with the proper performance of their duties.

Rendering Salutes in Military Manner. Officers and enlisted men are required by regulations to render the prescribed salutes in a military manner, the officer junior in rank or the enlisted man saluting first.

Several Officers in Company. When several officers in company are saluted, all entitled to the salute return it.

Man Addressed in Formation. A man in formation shall not salute when directly addressed, but shall come to attention if at rest or at ease.

In Public Places and Conveyances. In public conveyances, such as railway trains and street cars, and in public places, such as theaters, honors and personal salutes may be omitted when palpably inappropriate or apt to annoy or disturb civilians present.

For instance, as a rule, it may be said that an enlisted man riding in a street car, or in the act of purchasing goods in a store, or eating in a restaurant, would not salute unless addressed by an officer. However in case of a soldier occupying a seat in a crowded street or railway car, if he recognizes a person standing to be an officer, it would be but an act of courtesy for him to rise, salute and offer the officer his seat.

No Saluting at Double Time, Trot or Gallop. Salutes are not rendered when marching in double time or at the trot or gallop. The soldier must first come to quick time or walk before saluting.

The question of gait applies to the person saluting and not to the one saluted,—so, a soldier would salute an officer who was passing in double time or at a trot or gallop.

Enlisted Men in Command of Detachment. A non-commissioned officer or private in command of a detachment without arms, salutes all officers with the hand, but if the detachment be on foot and armed with the rifle, he makes the rifle salute, and if armed with a saber he salutes with it.

Salutes not Rendered by Troops at Drill, on March, Etc. Salutes and honors, as a rule, are not paid by troops actually engaged in drill, on the march, or in the field under campaign or simulated campaign conditions. Troops on the service of security pay no compliments whatever, nor do troops in trenches pay any honors. However, troops on the march and in trenches may be called to attention.

Bringing Command to Present Arms or Sabers Before Commander Salutes. If the command is in line at a halt (not in the field) and armed with the rifle, or with sabers drawn, it is brought to present arms or present sabers before its commander salutes in the following cases: When the National Anthem is played, or when *to the color* or *to the standard* is sounded during ceremonies, or when a person is saluted who is its immediate or higher commander or a general officer, or when the national or regimental color is saluted.

Saluting at Parades and Other Ceremonies While National Anthem is Played. At parades and other ceremonies under arms the commander shall render the prescribed salute and shall remain in the position of salute while the National Anthem is being played; also at retreat and during ceremonies when *to the color* is played, if no band is present. If not under arms, the organization shall be brought to attention at the first note of the National Anthem, *to the color* or *to the standard*, and the salute rendered by the officer or non-commissioned officer in command as prescribed in regulations.

Saluting by Individuals During Playing of the National Anthem; or Sounding of to the Color; Same Respect to National Anthem of Allied Countries. Whenever the National Anthem is played at any place where persons belonging to the military service are present, all officers and enlisted men not in formation shall stand at attention facing toward the music (except at retreat, when they shall face toward the flag). If out of doors they also render the hand salute, or if armed with a rifle, the salute prescribed for that arm. The practice of rendering the hand salute when the National Anthem was played indoors has been done away with, and officers and soldiers merely stand at attention as prescribed above. The position of attention and the salute, if rendered, must be maintained until the last note of the music.

The same rules apply when *to the color* or *to the standard* is sounded as when the National Anthem is played.

The same mark of respect prescribed for observance during the playing of the National Anthem of the United States shall be shown toward the national

anthem of any country with which we are allied when played upon official occasions.

Saluting the Color. Officers and enlisted men passing the uncased color will render honors as follows: If in uniform, they will salute as required by paragraph—"How salutes are rendered in uniform"; if in civilian dress and covered, they will uncover, holding the headdress opposite the left shoulder with the right hand; if uncovered, they will salute with the right hand salute.

USUAL MISTAKES IN SALUTING

The following are the mistakes usually made by soldiers in rendering salutes:

(1) They do not begin the salute soon enough; often they do not raise the hand to the headdress until they are only a pace or two from the officer—the salute should always begin when at least six paces from the officer.

(2) They do not turn the head and eyes toward the officer saluted—the head and eyes should always be turned toward the officer saluted and kept turned as long as the hand is raised.

(3) The hand is not kept to the headdress until the salute is acknowledged—the hand should always be kept raised until the salute has been acknowledged, or it is evident the officer has not seen the saluter.

(4) The salute is often rendered in an indifferent, lax manner—the salute should always be rendered with life, snap and vim; the soldier should always render a salute as if he meant it.

MISCELLANEOUS

Officer Walking or Riding with Senior. When walking or horseback riding with a senior, remain on his left, and if on foot, keep step with him. Likewise, if riding in a carriage with a superior, always sit on his left.

Soldier Walking with Officer. A soldier accompanying an officer walks on the officer's left and about one pace to his rear.

Prisoners do Not Salute. Prisoners do not salute officers. They merely stand at attention. In some commands it is customary for paroled prisoners and others who are not under the immediate charge of sentinels to fold their arms when passing or addressing officers.

Unmilitary Salutes. It is very unmilitary to salute with the coat unbuttoned or with hand in the pocket, or a cigarette, cigar or pipe in the mouth.

Not Dropping Hand or Weapon Until Salute Has Been Acknowledged. In saluting, the hand or weapon is held in the position of salute until the salute has been acknowledged or until the officer has passed or has been passed.

DISCIPLINE

The most important element in military training! As vital to the success of an army, as live steam to the operation of a locomotive. Without it the best of individual soldiers are but an armed mob, to be made a mockery by a trained foe; with a high type of discipline an army's powers are increased tenfold. Every great general in history has recognized this, and his success has been measured by his ability to inspire discipline.

Discipline represents seventy-five per cent of battle efficiency. Men and arms we may command, but money cannot buy discipline, nor munition plants supply it. It is of the very essence of training, and springs from the intelligence and conscientious work of the leaders who must inspire it, or whose incompetence will render its attainment impossible. This is what makes long thorough training so necessary, what makes military men shudder at the thought of war without adequate preparation. Our history is full of instances where otherwise splendid forces have been brutally defeated for lack of discipline. Intangible and psychic, the outgrowth of patient, skillful culture—it is no concrete thing to be handed to troops as they mobilize for war. It is as difficult to attain as it is necessary for success. Only adequate training may supply it, yet it may be lost in a day through the incompetency of leaders. Hence it is the one vital thing for you to understand.

Discard any vague conceptions of discipline as associated only with punishments and brutality. We mean something far higher than that. General Sherman said: "Discipline is the *soul* of armies." This means it is the spirit—the actuating spirit that inspires individuals to deeds of heroism, that gives them heart for patient endurance of untold hardships, that makes them freely surrender individual wills to the will of the leader, that binds them into a splendid fellowship, inspiring, sacrificing, training together for a common cause. This is the discipline that you must foster in your organization. To learn how to arouse it is the first duty of the leader.

Discipline may be defined as that psychic something which is always recognized by its manifestations of ever present respect for superiors and instant cheerful obedience, not only to given orders, but to a high personal sense of duty. It leads directly to *esprit*, from which springs *morale*; and, other things being equal, with the morale fifty men can beat two hundred. How clear then is the course for the successful leader—inflexible in discipline, arousing and fostering in his command pride and *esprit*, till finally they have acquired a morale that makes his men believe themselves invincible. Discipline is then not the end, but a means to an end—the end that each man shall be imbued with a spirit of loyalty to leader and to organization, which will result in unity and *promptness of action in instant response to the will of the leader*.

The one end sought in military training is so to have organized, trained, and disciplined the thousands of individuals who compose the army, that they may be made all to respond as one unit instantly and effectively to the will of the chief. This is the military machine working perfectly. Easily possible on the drill field, every one at ease, well fed and complacent; it can be done amid the strain and roar of the battlefield, only when training has made true leaders of every corporal and general, and developed an unshakable discipline in all.

MANUAL FOR COURTS-MARTIAL

PUNITIVE ARTICLES

NOTE.—Instructor will first read and emphasize the 110th Article of War covering the requirements in regard to reading and explaining the punitive articles to enlisted men.

The instructor will then read Chap. XVII Manual for Courts-Martial covering the punitive articles. In presenting this subject to the class, however, the instructor will not attempt to cover the whole chapter. Instead, he will explain to the class how to use this chapter as a reference, when necessary, illustrating by discussing a few of the punitive articles covered in the chapter. The following articles should be covered: Desertion—Absence without leave—Arrest—Confinement. The 95th and 96th Articles of War.

PROBLEM IN DRAWING CHARGES

Private Richard M. Smith, No. 4,876,532 Co. B, 302nd Infantry, stationed at Camp Devens, Mass., left his company and station without proper leave about 3.00 P. M., September 10, 1918, and did not return of his own will, but was apprehended by the military police in Boston, Mass, about 10.00 P. M., September 25, 1918. When apprehended he was in civilian clothes and was drunk.

This man was serving in his first enlistment period, was 26 years old, was carrying \$10,000 War Risk Insurance, and had a Class "A" allotment running. At the time charges were preferred this man was in confinement in the guard house of the 302nd Infantry.

Draw up the charges in this case, charging the accused under the 58th and 96th Articles of War, with one specification under the 58th and two under the 96th.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
ADMINISTRATION

TYPICAL QUESTIONS FOR WRITTEN EXAMINATION

FINAL EXAMINATION MOTOR TRANSPORT OFFICERS' COURSE

- 1. a. What is The General Staff Corps?
b. What is A Special Staff Corps?
c. Distinguish between the two.
- 2. a. What are the duties of The Staff in relation to The Line?
b. What is the Service of the Interior?
c. What is the Theatre of Operations?
- 3. Outline the duties of The Motor Transport Corps.
- 4. a. Under what circumstances may an officer make an allotment of pay for the support of his family?
b. What is mileage?
c. How are officers paid?
- 5. a. Draw a diagram showing the distribution of authority in a Motor Transport Company.
b. Give the duties of the company commander.
c. Give the duties of the first sergeant, property sergeant, chief of section.
- 6. a. How is a soldier paid when separated temporarily from his Service Record?
b. What is the Service Record and what data does it give?
c. What steps are taken in case of loss of a Service Record?

7. 2nd Ind.
.....
.....
To
This soldier
.....
He was last paid to include.....
By
Due United States.....
.....
This soldier.....an allotment running.
(has or has not)
His character is.....
.....
.....

Fill out the above indorsement of service record, assuming all facts necessary.

- 8. a. Name the parts of a letter.

- b. Give the channels through which a letter from an enlisted man requesting a furlough would be required to pass; assume this man to be a member of a Motor Transport Company which is a part of a Motor Command at a camp in this country.
- c. Give five rules to be followed in military correspondence.
9. Write a military letter containing two enclosures; add the first indorsement.
10. a. What is a correspondence book?
b. What is a document file?
c. Explain their use in connection with each other.
11. a. Assume you are in command of Motor Transport Company K; five men report for sick call on October 1st, 1918. Make out sick report for the day covering both the company officer's report and the medical officer's report.
b. What is the Guard Roster?
c. Illustrate the difference in keeping the Guard Roster and the roster for other duties.
12. Make out a morning report for October 8, 9, and 10, covering the following changes:
October 8—One private from duty sick in hospital.
One private from absent without leave to duty.
Three privates from detached service to duty 2.00 P. M.
October 9—One sergeant from hospital to sick in quarters.
Two corporals from sick in quarters to furlough.
Two recruits join company at 3.00 P. M.
October 10—One private from absent without leave to confinement in the guard house.
One sergeant from furlough to duty 2.00 P. M.
One corporal from hospital to duty 3.00 P. M.
Company strength on the 8th of the month:
One captain.
One first lieutenant.
One second lieutenant.
One first sergeant.
Five sergeants.
Thirty-four corporals.
Forty privates first class and privates.
13. a. Make out a ration return for the company at the conclusion of the above period.
b. What is meant by soldiers' deposits?
c. Assume that you are commander of a company; an enlisted man of your company about to go on a furlough and needing money offers to sell you his soldier's deposit book; what would you do, and why?
14. a. What persons are subject to military law?
b. Under what circumstances is martial law declared?
c. What is meant by jurisdiction?
15. a. Give in detail the steps taken by a company commander in equipping his men with clothing.
16. a. When and by whom may an officer be placed under arrest?
b. Under what circumstances may an officer be placed in confinement?
c. Distinguish between arrest and confinement.

17.
 - a. Name 15 forms that will be used in a company office.
 - b. Make out a Report of Survey, Form 196 A.G.O. Assume any facts necessary.
18.
 - a. What is a deposition?
 - b. Name two kinds of general pleas.
 - c. What is meant by arraignment?
19.
 - a. Name the kind of discharges and tell under what circumstances each is given.
 - b. What is a final statement.
 - c. Give the information contained therein.
20.
 - a. What monthly returns are rendered by a Motor Transport Company?
 - b. What data is contained in Form M.T.C.—117?
 - c. Distinguish between accountability and responsibility.
21. Describe in full, giving number of copies and disposition made of each, the following forms:
 - a. Stolen Property Report Form M.T.C.—111.
 - b. Investigating Officers Report of Accident, Form M.T.C.—125.
 - c. Memorandum Receipt, Form M.T.C.—101.
22.
 - a. What are the disciplinary powers of commanding officers?
 - b. What is the procedure on revision of a general court-martial finding?
 - c. What are the Punitive Articles of War?
23. Make up Form M.T.C.—118, weekly report covering a Motor Transport Company organized according to tables of organization.
24.
 - a. What is meant by customs of the service?
 - b. Name five.
25.
 - a. Give rules to be observed by individuals when the national hymn is played.
 - b. Write a short essay on the necessity for discipline in the army.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH
Motor Truck Officers' Course
THEORETICAL AUTO ENGINEERING
LECTURE I

ORGANIZATION OF MOTOR TRANSPORT SUPPLY SYSTEM IN FRANCE

We shall commence these lectures with the supply system, and devote some discussion to the various repair units and parks coordinated with that system, taking up each one separately and defining in detail just what part of the system it forms and the duties required of each branch, respectively.

The supply system is designed to give the most efficient service with the least duplication of stock, and to expedite salvage to save ocean tonnage. In view of the diversity of makes of vehicles, it will be impossible to stock each depot with parts for all of them, consequently vehicles of each make will be segregated.

The main supply depot will automatically receive all new M.T.C. supplies excepting gasoline and oils, which are received at base ports in France, or by European purchase. From these base ports gasoline and oils are supplied on requisition to advance depots and parks for use or issue to groups. Normally, the depot sections of overhaul and service parks will be operated as advance depots to obviate the duplication and extra handling of stocks.

The theory is that operating units in the field will requisition on service parks, service parks on overhaul parks, and overhaul parks on the main supply. This procedure may be modified as the case requires.

An overhaul park is normally equipped to repair certain designated types and makes of vehicles, and the segregation of different makes enables the main supply depot to utilize the supply section of the overhaul park as an advance supply depot.

Supplies necessary to vehicles are of two classes: Articles common to all vehicles, irrespective of make or type, and articles pertaining to individual makes or types. Overhaul parks carry the required stocks of each.

All articles required in operating vehicles have been catalogued. Catalogue No. 1 covers material common to all vehicles. Parts pertaining to individual types are listed in special catalogues. In each catalogue articles are specified as "expendable" or "non-expendable." The former indicates an article that will be replaced only when an old part accompanies the requisition. If it is impossible to return the old part, a certificate covering the reasons therefor must accompany the requisition.

The object of the foregoing is to insure the return of the old part for any salvage work that may be possible on it, and prevents a transport unit from accumulating a junk pile that would interfere with mobility. Also, it allows a technical examination of worn out or faulty material, and this is information which is essential to the proper operation of the maintenance division.

With this in view, a service park draws its supplies from the advance depot designated in orders as its supply point. In the absence of such orders, serv-

ice park supplies will be drawn from the main supply department. Thus stocks will be kept at a minimum and distributed with the greatest efficiency.

The transport companies and other M.T.C. units will draw their supplies from the service parks to which they are assigned.

Gasoline and lubricating materials are supplied direct to groups and other M.T.C. formations by the gasoline and oil service, organized under the supplies division of the office, C.Q.M., S.O.S.

The above gives an idea of the supply system. Now we will take up the different kinds of parks of the service. First:

A reception park will be established at each vehicle manufacturing plant in the United States, and each base port in France. At these parks vehicles will be received, properly registered, set up, and formally forwarded to designated replacement or organization parks or, when the exigencies of the service so require, they may be sent direct to the organizations to which they are assigned. The issue of such vehicles to such units in this manner is made only on the orders of the C.G., S.O.S.

In addition the reception park will consist of the necessary personnel, grounds, buildings and equipment for registration, storing and issuing M.T.C. vehicles. The lay-out of the park will be such that the process of a new vehicle from the time it is received from the manufacturer until it is issued will be a continuous flow in a given direction.

Upon arrival, a vehicle is uncrated and registered by means of a tag attached to the steering post, and the number on the tag is later stenciled on the body. Blocks of registration numbers are periodically forwarded by the director of the M.T.C. to reception parks for issue to incoming vehicles. Immediately after registration, all tools, accessories and equipment belonging to the vehicle are stored until the vehicle is ready for use.

The vehicle then moves to the shop section of the park, where it is assembled, stenciled and necessary repairs made, after which it is sent to the issue section. Until issued, it is kept clean, oiled, and the motor started daily.

Registration cards will be made out in duplicate, one copy to be retained and the other sent to the headquarters of the M.T.C. A log book containing the necessary data will be included in the vehicle's equipment.

Vehicles will be issued to replacement or organization parks on instructions from the director of the M.T.C., using form M.T.C. receipt, in quadruplicate. When the exigencies of the service demand it, vehicles may be sent direct to other organizations on orders of the C.G., S.O.S. A daily report on form M.T.C. 135, covering all vehicles issued, received, on hand, and ready to issue, will be made to the director of the M.T.C. When assigned, vehicles may be forwarded by rail or overland.

Next we have the organization parks which in turn receive their personnel from the cantonments, camps, base ports or various other sources. Vehicles are obtained from the reception parks and any other equipment necessary from the main supply depot. Vehicles and men are organized and equipped for service and held in readiness for assignment, either as individuals, detachments or organizations.

Schools receive personnel by assignment from cantonments, casual camps, base ports, hospitals and various other sources; also such vehicles as are required for their equipment from reception parks, and other equipment as is necessary to their operation from the main supply depot. Students are trained by a corps of instructors maintained for that purpose, examined, classified, and formally forwarded to the designated organization park as required.

Replacements parks are operated much the same as organization parks, inasmuch as they receive personnel from the same sources as schools. Vehicles are obtained from reception, reconstruction, and overhaul parks and in some cases from service parks. Other equipment is obtained from the main supply depot. Vehicles and personnel are organized and equipped for service and sent forward to replace casualties.

Now we come to the parks actually engaged in repairs. Many of the men engaged in this course will be assigned to this service or at all events it is a department with which there is always much to do. Therefore, the repair system showing the different parks and establishments, which start with the company near the front line and end up with the reconstruction park, which is the factory for the A.E.F., will be outlined.

Attached to each company there is a light repair truck. On this light repair truck is a standard stock of tools and parts, which is made up of ten days' supply of all small parts, such as spark plugs, nuts, bolts, valve springs, brake lining, and the minor parts which are needed in quick repairs. There is also on this truck a fairly complete assortment of hand tools. That stock is kept up by requisition every other day on the next larger unit, which is the service park. So that your stock on hand, plus your requisitions which are in process of going through, should equal the standard unit equipment list of that truck at all times, and the company mechanic should never allow that equipment list to depreciate.

The next step in the chain is the service park. A service park is a mobile machine shop unit with a personnel of 35 men and an officer. This personnel is made up of the different trades. There is a radiator man, chassis man, engine man, electrical man, tire man, and so on. The service park keeps on hand at all times a ten days' supply of larger parts (not assemblies), such as connecting rods, bearings, bushings, brake lining, etc. A service park is supposed to take care of the repairs on 148 trucks, and a proportionate number of passenger cars and motorcycles, and to handle repairs on six trucks at one time in the park. The unit equipment list for a service park is laid down in bulletins and consists of a definite number of bearings, connecting rods, bushings and parts for all the vehicles which it serves. No repairs are attempted in a service park that will require more than ten days to complete.

The next link in the chain is the overhaul park. The overhaul park is a much larger unit and may consist of any number of men. We have a system of repair sections, groups and units. The section is the smaller and consists of 77 men and 3 officers. By grouping together 4 sections and a headquarters we make a repair group. By grouping together 4 groups and a headquarters we have a repair unit. We can make an overhaul park of any size we want. We can take one section of 77 men and 3 officers and make that an overhaul park, or take 4 sections and call it a repair group and make that a larger overhaul park, or take 4 groups and make it our largest unit, which is the repair unit, and consists of 1280 men. The repairs made in the overhaul park are practically all the repairs that can be made to the vehicle, except reconstruction.

If a vehicle is badly damaged by shell-fire or totally wrecked through misuse so that all the working parts will have to be replaced, and it is more a question of salvage than repair, that vehicle goes back to the reconstruction park and is not touched by the overhaul park at all; but, if the work consists of tearing down the motor and rebuilding, tearing out the transmission, rear axles, etc., the overhaul park handles it. Assemblies are taken apart here and assemblies are carried in stock as part of their standard list of parts and supplies for the trucks which they are supposed to serve. Each overhaul park can take care of

the repairs on 1800 to 1900 trucks. It can handle 100 trucks at one time in the park. The overhaul park is, of course, farther back from the line than the service park. The service park is usually within sound of the guns and near the rail head; within reach of the supply and ammunition trains.

The overhaul park would probably be back 25 to 30 miles from the line and perhaps more, depending on whether that sector of the front happened to be active or not active.

Overhaul parks have quite an elaborate machine tool equipment, and they can actually make small parts in the park. The time factor enters into all repair work, except that done in the reconstruction park. No repairs are allowed in a service park that require over ten days. If a vehicle, in the opinion of the inspector, will require over ten days for its repair, it is sent back to the overhaul park. If it requires more than 20 days in the overhaul park, it is sent back to the reconstruction park. In that way we do not clog up the service and overhaul parks with a lot of dead material, thereby making them immobile. Mobility must be the first consideration these days. It may be added that an overhaul park quite often is an advance spare parts depot and by an advance spare parts depot is meant a depot that keeps 30 days' supply of all parts for all trucks operating in the area which it serves. That includes rear axle assemblies, transmission assemblies, clutch assemblies, and even motor assemblies, and, where it is deemed advisable, a motor is set in and the old motor taken out, and the old one repaired later and put back in stock. In fact, repairs of this kind are frequently handled in this way. The assembly is replaced and the truck put back into commission, while the taken-out assembly is replaced at another time when work will permit.

The next link in the chain is the reconstruction park, which is a very large organization. It has a large roofed area and you might liken it to one of our large automobile or truck manufacturer's plant in this country. It is an enormous proposition and when you are told that for one army alone we have to have upwards of 80,000 vehicles in France you can realize that we need a large factory to look after their repair.

At the reconstruction park all reclamation work is taken care of. It is called salvage. All complete overhauls are made there. Vehicles come back from all the overhaul parks to the reconstruction park when the time factor will not allow the overhaul park to make the repairs. Broken parts and broken vehicles have to be returned for salvage by every member of the A.E.F. Even though you think a part is absolutely valueless you are charged with the responsibility of seeing that that part goes back for salvage. The metal in broken parts can be melted up and reshaped into tools, babbitt can be melted and re-used, broken parts can be repaired by careful machine work and by brazing and welding. We also must have broken and worn out parts returned to find out whether those parts are defective from poor workmanship or material or worn out through fair wear and tear. This is important, for we must make recommendations for changes in construction on the basis of this information. Broken parts come back through the various parks and establishments to the base spare parts depot which is in close proximity to the reconstruction park. The base spare parts depot turns the broken parts and supplies over to the reconstruction park, which reclaims all parts that is possible to reclaim and then turns them back to the base spare parts depot for stock. That is the work of the reconstruction park. In other words, when you order parts from the service park, you may not get a new part, but you may get a part that has been rebuilt. It is just as good. That system of salvage and the importance of it will be made the subject of a separate lecture later on in the course.

To return to the company repairs. Company repairs are quite the most important factor in the Motor Transport Service of the A.E.F. If the proper care is not given to lubrication and adjustment and repair work in the company, both in park and on the road, it echelons all the way down the line, our service parks are overcrowded, our overhaul park is overcrowded, and our reconstruction park is swamped. And really, when you come down to the last analysis there is very little excuse for a vehicle going back from the company to the service park except for a periodical overhaul and except for damage by shell-fire. If the driver is a good driver, properly trained, if the company mechanic is an iron master as far as upkeep is concerned and is on the job, there will be a minimum of extensive repairs and consequently less work for the service, overhaul and reconstruction parks. Company repairs occupy the full time of the company mechanic and his assistants and a large share of each driver's time when not actually at the wheel of his truck.

MOTOR TRANSPORT CORPS**EXECUTIVE DIVISION—TRAINING BRANCH****Motor Truck Officers' Course****THEORETICAL AUTO ENGINEERING****LECTURE II****CARE AND MAINTENANCE OF MOTOR VEHICLES**

Too much stress cannot be laid on the care of motor vehicles. They must always be ready to go. Constant watchfulness is the only thing that will insure their being ready to move at a crucial moment. It must be understood that warfare as it has developed in the last three or four months has made the motor truck more of a factor than ever in the success of an action, for the reason that the lines of communication are constantly changing. Food, munition, supplies, engineering material, etc., must go with the army.

As an instance, only the closest supervision will detect the bolt that is about to be sheared off. If replaced before the start is made, the truck will not be stranded on the road when some battery is waiting for shells. Constant watchfulness and attention are absolutely essential to efficiency.

There are several requirements that the motor truck covers as a transportation unit.

First, the moving of supplies. In this the first item is the Motor Transport Corps main supply depot. All new supplies are sent there for issue and distribution. Supplies from base ports and from reconstruction parks are also sent there, as well as local purchases made by the general purchasing board. The functions of this depot consist of the requisition, receipt, storage and issue of M.T.C. parts, supplies, materials and equipment. This depot also carries the main and reserve supply stock of these materials. In principle, operating units requisition from service parks and overhaul parks, which in turn deal directly with the main supply depot M.T.C. Any requisition made for non-expendable articles must be accompanied by the old article or some portion of it, with a M.T.C. salvage tag (Form M.T.C. 119) attached, or a certificate by the requisitioning officer explaining the reason why the old part or article is not returned. Complete details covering the issue of parts, supplies, materials, etc., will be taken up later on.

The above is a general description of the main supply depot. When different overhaul parks or service parks requisition the main supply depot, there must be some way of transporting the material requested. If this cannot be done by railroad it must be done by truck.

Most of the ammunition, engineering, and supply dumps in France, except where the material is stored in warehouses, are either in open fields or forests. It is not so necessary to camouflage the engineering material or the supplies for the reason that even if they are bombarded there is no danger of explosion. The ammunition dump is made as irregular as possible, and the ammunition is scattered all over the field so that if the dump is bombarded it will have to be hit a good many times to do much damage. As a further protection, sand bags are placed around the ammunition dumps.

In the engineering or supply dumps, the trucks go in through one entrance. The office of the dump is near this entrance. The roads, like the roads in the ammunition dumps are what we call corduroy roads and are made out of logs fastened together with large staples. They are laid through the whole dump and it is impossible to get a better road for this purpose. A corduroy road affords good traction, due to the rough surface. A truck rarely skids as long as it is kept squarely on the road, but once off the road there is great difficulty getting back on again. When operating on these roads, the first thing to learn is to go slow. This will not rattle the truck to pieces, out of control and off the road. It is very easy to get the front wheels caught. A loose log hit by the front wheels, may send the truck into the ditch. In the day time when a section has completed loading, the sergeant is given instructions by the company commander to proceed to the point of unloading. At night it is customary to form the whole company before leaving the park.

Regarding the method of backing trucks on these narrow corduroy roads. Imagine that a truck on a corduroy road is backing up to a shed or car that may be 100 feet back from the main road. If the driver sitting on the seat attempts to watch the road and back at the same time, he will find himself in the ditch, no matter how good he may be. This has happened time and again. It is necessary to back the truck absolutely straight.

To avoid the danger of getting a wheel in the ditch when backing, the best and most practical way is to employ the following system: The driver is at the wheel. The second driver is on the road in front of the truck. By a system of hand signals, the second driver directs the driver which way to go. The driver is to watch only the second driver in front. If these two men understand their signals well, they will be able to place the truck in about half the time it would take one man to do it. If the man on the ground wants the driver to go straight back, he signals with his hands, the movement and the speed of his hands indicating the direction and the speed of the truck. Suppose in going straight back, the rear of the truck begins to get a little off to the right of the road. The second driver will move his left hand in the direction the rear wheels are to be turned and vice versa.

In the American schools in France, men are required to practice sometimes for hours backing between posts. It is necessary to be proficient in backing because there is a lot of backing to do when driving at the front.

One of the most important things in this course is the need of the strictest mechanical supervision and inspection of trucks. Experience has taught us that unless there is the most rigid system of inspection the results will not be at all gratifying. There seems to have been a great deal of discussion, and sometimes misunderstanding, as to how far the driver should be educated in the mechanical construction of his vehicle. Some have said that he should not have any instruction except in driving and that he should be entirely ignorant of the theory and practice of automobile engineering. On the contrary it is advisable to give the driver every bit of instruction along that line that the conditions admit while he is going through school, and if he is there for quite a length of time his continued study of the construction and adjustment of the vehicle which he is operating, both the theoretical and the practical, may give him sufficient knowledge so that when he is through with his training he knows when shifting into first gear just what is happening in the transmission, and he also knows the difference between a surge in the motor caused by the carburetor being badly adjusted, and a surge due to two cylinders not firing properly. A driver is very often called upon to make minor adjustments under the supervision, if possible, of a company mechanic, but

the company mechanic cannot be everywhere at once and the driver has to be able to do these things by himself.

The driver is responsible for the proper cleaning of his vehicle. Perhaps that does not sound important to you, but it is highly important. We have been criticised in France in the American Army on account of the appearance of our trucks and cars. They were not washed; mud would remain on them for weeks; they were not properly lubricated; drivers were sloppy in appearance and driving, and very often they would pull up at some divisional headquarters alongside a British headquarters staff car or a French headquarters staff car. The comparison was terrible to look upon. The British or French cars would be as bright as a new penny, although in service perhaps for three or four years. Every bit of brass and metal would be shined up, the frame, the drive shaft and rear axle housing, ordinarily neglected by you and me, would be thoroughly cleaned up. You could put your hand on any part of the car. That is why those vehicles are running after four years of service. The cleaning of the vehicles should be done every day. There is one part of the cleaning that can be done every day and must be insisted upon by every company commander, noncommissioned officer and mechanic, and that is that the dirt and dust be cleaned from the spring shackles and all moving parts of the vehicle. This is absolutely essential, because of the great trouble we have in keeping spare parts in France. We have not had anywhere near a sufficient stock of spare parts for any of the vehicles in France up to the first of May of this year and the lack of them was a very serious proposition. The proper cleaning of the car will cut down the necessity for spare parts tremendously.

The next thing is the lubrication of the car. There are certain things which must be done every day and certain things which must be done at stated intervals such as every 250, 500, 1,000 and 2,000 miles. It is necessary to know the M.T.C. manual and to study those things which must be done at the various periods.

In addition to lubrication, there are other things which must be done at the stated intervals before mentioned. All of these are in the manual beginning on Page 69.

(a) Care must be given to appearance, as well as to mechanical perfection. See that the body and wheels are cleaned of dirt, and inside of body cleaned out.

(b) Be on the lookout at all times for all leaks, and for unusual noises; find the cause immediately and remedy it.

(c) In screwing up grease cups always make sure that the grease has actually been forced into the bearing.

(d) Never cut out the muffler.

(e) Never, under any circumstance, fill the gasoline tank or work on the carburetor in the presence of a naked flame or an oil lantern. If this work must be done in the dark, use an electric torch.

After each run: (To be done as soon as truck returns from run.)

(a) Fill up gasoline tanks (including reserve supply), oil lanterns, head lights and generators.

(b) Drain carburetors. (Much water and other impurities are often found in gasoline. In freezing weather drain radiators.

(c) Remove mud and dirt from places in immediate proximity to joints and moving parts, such as reach rod joints, spring shackles, distance rod hangers or joints, torsion rod joints, and springs.

(d) After removing all dirt turn down grease cups at all places one turn.
(e) Examine and tighten all loose nuts, screws, etc., including those of the wood-work.

(f) Wash entire truck, if possible.

At end of 250 miles:

- (a) Fill up all grease cups and see that oil holes are not stopped up.
- (b) Clean motor and pan under motor; clean spark plugs; oil magneto (only drop or two); clean carburetor.
- (c) Examine clutch; permit no oil on a leather faced clutch.
- (d) Transmission Case; fill with lubricant if necessary.
- (e) Brakes; examine and regulate tension.
- (f) Chains; examine tension.
- (g) Clean oil strainers.
- (h) Examine all wiring as to insulation and connections.
- (i) Go over all nuts and bolts.

At end of 1,000 miles:

- (a) Drain crank case, wash with kerosene, and fill with fresh oil. (Save old oil to return to service park.)
- (b) Jack up body and clean and grease spring leaves.
- (c) Remove chains, bathe in kerosene, clean with brush, grease and put back.
- (d) Fill differential with oil.
- (e) Examine all grease boots and clean and refill, if necessary.

It is necessary to be constantly looking for loose nuts and connections and be constantly tightening these. Our spare parts situation in France will always be a serious one. We will never have as many parts as are needed and seldom will the supplies and parts be where they are wanted. For this reason, whenever the truck stops to load or unload, or whenever there is a few minutes' time in the park, the truck should be gone over very carefully from the front bumper through to the tail gate to be sure that everything is tight and that no defects or mechanical troubles exist that may hold up the truck on the road.

The Motor Transport Corps in France is charged with moving the freight of the A.E.F. Freight cannot be moved if the truck is out of commission. Troubles corrected before they become serious prevent excessive demands for spare parts, decrease the work of the company mechanic, to the service park, of the overhaul park and of the reconstruction park and greatly simplify the maintenance problem. A burnt out or frozen bearing is inexcusable, and in France is cause for court-martial proceedings in every case. There is no reason whatsoever for trouble of that nature. There is no excuse and none will be accepted. The causes of breakdowns in the Motor Transport Corps in France are in 7 cases out of 10 due to the inefficiency of the drivers of vehicles. These drivers were not properly trained. They had no conception of discipline before going to France. They were slovenly in their personal appearance. Their trucks were dirty, not properly lubricated, parts were lost off the trucks, thereby tying up that piece of equipment for days and sometimes weeks. Bearings were burnt out, brakes burnt out, clutch facings ripped off unnecessarily, radiators smashed, and the vehicles generally not able to handle the freight. If allowed to continue, these things are nothing short of criminal offenses, which at this time deserve the strictest disciplinary

action. Both the driver and the company mechanic are responsible for the log-book which accompanies every vehicle in France. This book is issued to the vehicle at the reception park at the port of debarkation. It stays with the vehicle as long as the vehicle is in service. This log-book is about 4 inches wide and 6 inches long. In it are kept records of transfers of the vehicle and of all repairs made by any repair parks. The first page of the book is given over to the specifications of the truck, the engine number, the chassis number, U. S. number, the type and model of the truck and the detailed list of the equipment which was placed on the truck at the reception park. Beginning with the next page there are spaces for the driver to sign for the vehicle and for its equipment and in each case of transfer, his signature is witnessed by the signature of the Commanding Officer. The last 3 or 4 pages of the book are given over to records of repairs made. This record shows the number and name of the repair park making the repairs, what the repairs consisted of, what spare parts and supplies were required to make the repairs, and the signature of the inspector or officer entering this data. The information regarding repairs which is entered in this book is invaluable at headquarters, as it shows the performance of a truck and also the class of repairs that are made on that particular make of vehicles and enables steps to be taken for the correction of defects and changes in construction. This log-book is to the car what the service record is to the soldier, and the driver is held rigidly responsible that it is not lost and that it is kept clean and all data entered up to date.

Conservation, now that we are at war, and the soldier is using, not his own material, but the government's, is a positive obligation. The writer experienced a lesson that was very forceful while in France, which portrays the idea of conservation about as well as any demonstration could. When I signed for my motorcar I was given a list of tools which I was required to invoice, and sign for also. Among them was a small brush which had very few bristles. I threw it into a box and forgot about it until I had need of a brush to clean around my motor in places which were too small for access with the hand. The old brush was resurrected, but after a few moments I discovered that it would not do the work, so I threw it away. At the moment a French officer came along, and seeing what I had done pointed out in a genial way my mistake by saying: "You do not realize that the brush you have thrown away came all the way across the Atlantic." No one can say how many times that brush had been handled, recorded, requisitioned, etc., and while the brush was useless, the handle was still as good as new. There are many places in France where the brush could have been repaired, and, with the handle intact, it would have been fifty per cent complete to start with. Should a number of other drivers do the same thing, say, for example, 144 of them, a gross of brushes would have to come all the way across the Atlantic. This space could be better used for a case of machine gun cartridges.

When parts have been broken they should not be thrown away. The breakage may be due to faulty manufacture, and if the laboratories find this to be the case, the conditions can be remedied.

Roadside repairs are a very fruitful field for losing tools. Before getting under way, look around, make sure that everything is in its place. In taking over a truck in France the truck and its equipment must be signed for. By equipment is meant the tools, small parts and supplies, the tarpaulin, the bows, the lamps, the fire extinguisher, the towline, the pick and shovel, and all the other equipment which is found on a unit equipment list for a truck. This list is standard and is made out in duplicate at the time the truck is put into service. The original is printed on cardboard and is kept in the truck at all

times. The driver is responsible for the articles checked or marked on this card, and if when the truck is turned over to another driver, anything is lost or stolen it must be paid for. No excuses are accepted and none should be given. This is made necessary by several reasons, but the main one is that equipment is too scarce and too valuable, and too difficult to replace in France.

When an extra spark plug is used from the tool kit, go immediately to the company mechanic and requisition a new one. When cotter pins, nuts, bolts or valve springs or valves are used from your truck equipment immediately get supplies from the company mechanic to replace them. Equipment should never be allowed to get down under any circumstances. The supplies and tools that appear on the list are the minimum amounts necessary to keep the truck in service. Therefore the truck should never be caught short of any of these things when emergencies arise on the road away from the company park or a repair park.

The same thing applies to gasoline, oils and tires. Regarding gasoline, after being handled so many times and transported across the Atlantic, there is an unusual amount of water and dirt mixed with it, so that continual vigilance is required in the filling of tanks on vehicles. Gasoline should always be strained through a piece of chamois, which will help a great deal. The strainer on the carburetor and main feed pipe from gas tank to carburetor should be continually watched, as both of these are frequently choked up with dirt and grit. It is necessary to keep close watch on the carburetor in freezing weather if there is much water in the gasoline.

MOTOR TRANSPORT CORPS

EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course

THEORETICAL AUTO ENGINEERING

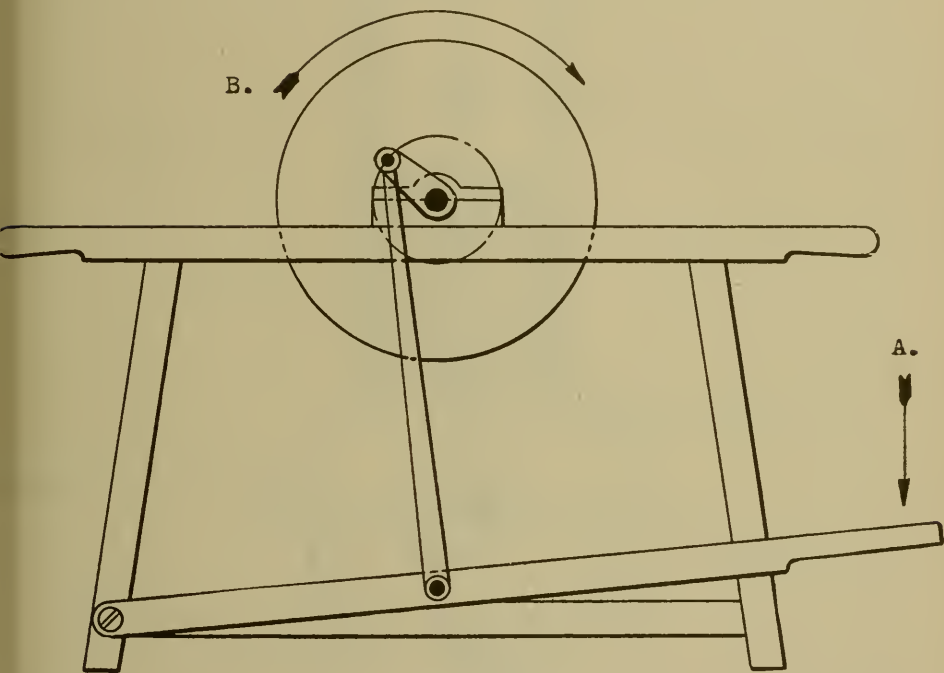
LECTURE III

ENGINE

We will start with the power plant. Every one of you at some time during your past has had the opportunity to see or possibly operate the old-fashioned grindstone in which the power is applied with the foot by means of a foot treadle, and with a few necessary parts, reciprocating motion is converted into rotary motion. Let us draw a sketch of this outfit on the blackboard (Plate No. 1). We have the stone which is made heavy enough to overcome the upstroke of the foot treadle, as the upstroke is not the power stroke. The grindstone is supported on an axle or a shaft mounted in bearings. At the end of the axle or shaft and at right angles to it is a small arm which is called a crank. Hence we have the familiar term, crank-shaft. The next step in the construction is the rod which connects the point of power application to the crank-shaft. This is known as the connecting rod which, incidentally, is simple enough because, as its name implies, it simply connects the two points. The speed of the stone depends upon the power applied at the treadle. Hence the conversion—reciprocating into rotary motion. For convenience, we will invert the blackboard and eliminate the frame and foot power attachment (Plate No. 2). Our next procedure will be to construct the labor saving method of power application to the connecting rod and incidentally accomplish our needs. Leaving the grindstone for a minute let us imagine we have an ordinary muzzle loading cannon. The first thing we have to do is to place the charge of powder in the cannon. Then we bring out the old familiar ramrod and compress the charge by ramming it into the breech. At this point we have explained two functions, one being charging and the other being compressing. For convenience, we will place the cannon on the blackboard in such a position as will permit us to utilize the power of the explosion (Plate No. 3). A cast iron trunk or piston is placed on the upper end of the connecting rod so as to retain as much power as possible. Assuming ignition now to take place and allowing that the charge is not too heavy, the piston would be blown to the lower end of the cannon or the end of its stroke. The grindstone which is now assuming the role of a flywheel, stores up enough energy to bring the piston back and in so doing so exhausts the burnt charge providing that means were allowed for the exhaust. It is apparent from the foregoing talk that to convert reciprocating motion into rotary motion, there are four individual functions performed in the gasoline engine. One is the admission or the charge, the second one being compression, the third function being ignition or the power stroke, and the fourth is the exhaust. Hence, the four cycle engine.

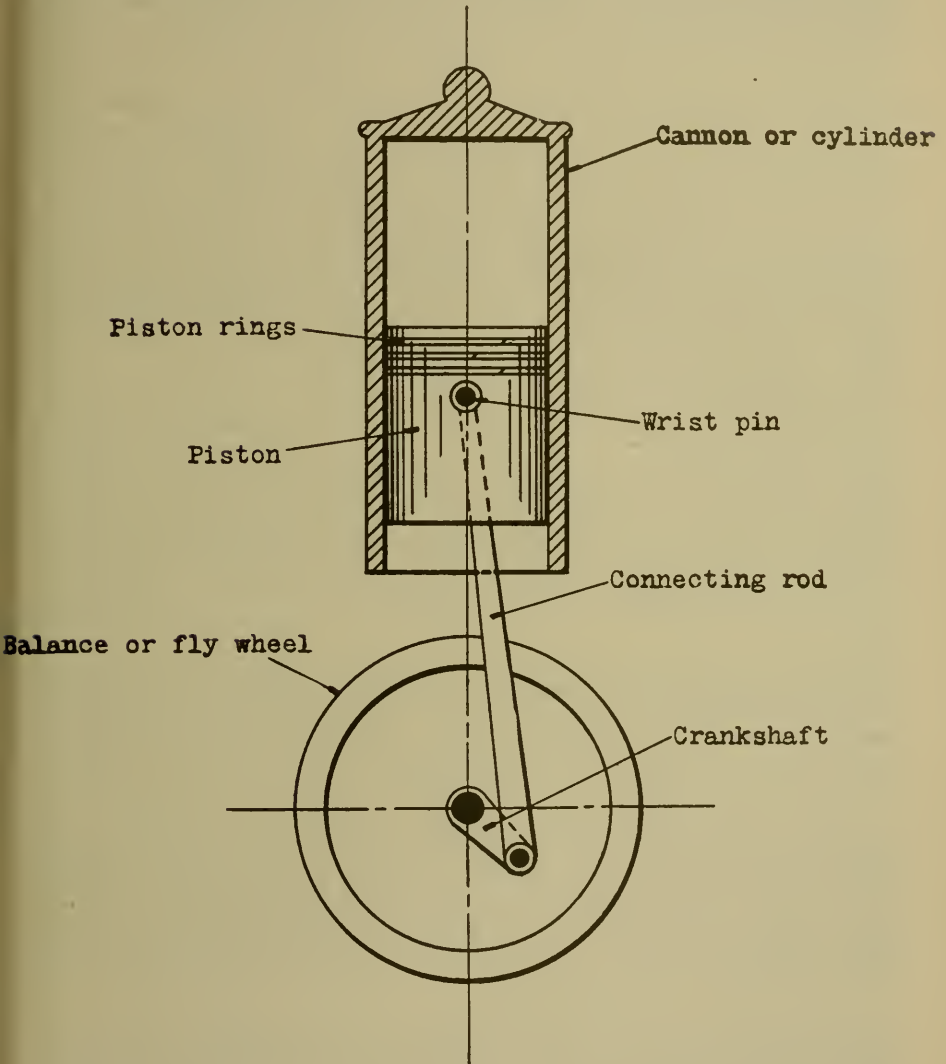
It will be well for us to memorize the nomenclature of the parts just mentioned. Starting with the Balance or Fly Wheel, we have the Shaft which supports it. As I previously mentioned this Shaft is called the Crank-shaft, and is mounted in the Main Bearings. To the Crank Pin is fastened the lower

PLATE NO. 1.



Arrow A indicates where power is applied, the motion being reciprocating.
Arrow B indicates the conversion into rotary motion, also the direction of the wheel.

PLATE NO. 3.



Utilizing the power of the cannon to convert reciprocating into rotary motion.

end of the Connecting Rod. The Connecting Rod, whose function is to connect the Piston to the Crank-shaft at the upper end, is, by means of the Piston Pin, fastened to the Piston. The Piston reciprocates in the cylinder.

As you no doubt are familiar with the fact that we have four, six, eight and twelve cylinder motors, I may add that for every cylinder there is an extra crank on the crank-shaft, and likewise a complete piston assembly with all of its auxiliaries is required.

Note to Instructor.—Answer all questions excepting those pertaining to valve or piston construction.

Connecting rods are made of steel forgings. The upper connecting rod bearing is usually a bushing of hard bronze forced into the boss at the end of the connecting rod. It bears on and runs in connection with the wrist pin which passes through it, the wrist pin being case hardened steel. A connecting rod is usually equal to 2.5 times the length of the stroke. Long stroke motors have longer connecting rods than short stroke motors. The lower end of the connecting rod has a lining or bushing of Babbitt or white metal where it fits the crank pin. On light low priced engines the Babbitt metal is often poured directly into the rod end and rod cap. On higher priced cars the bushings or linings are generally removable. They may be die cast to the exact size and form. The better construction is where the bushings are bronze shells lined with a layer of high grade Babbitt not over 1/16 thick.

As has already been mentioned, the upper end of the connecting rod is attached to the piston by means of a case hardened steel wrist pin. There are two general methods employed in attaching these two units. The connecting rod is sometimes clamped to the wrist pin and allows the wrist pin to oscillate within the bosses of the piston, which are usually lined with bronze bushings pressed into the piston. This type is known as an "oscillating" wrist pin. The other type is known as the "stationary" type; the wrist pin being securely held in position within the piston bosses by means of a set screw or other suitable device, and the oscillating motion occurs between the wrist pin and the connecting rod upper bearing, which is also usually a bronze bushing pressed into place.

Excessive wear makes it necessary to replace the piston pin and piston pin bearing. Renewing of the bushings only is often insufficient as the pin is generally worn also. A shoulder on the pin can generally be felt or the wear can be detected by measuring the pin with a micrometer caliper. As a rule the connecting rod bearings and the wrist pin bearing wear more than the main engine bearings and should be examined first.

Difficulty is sometimes experienced in removing piston or wrist pins. This can many times be accomplished by turning down a rod that will slide freely through the bushing and then threading it. Over this is fitted a bushing slightly smaller than the hole in the piston. If the rod threaded is a standard S.A.E. thread, a standard nut may be used, and by screwing the nut down on the rod the pin may be drawn out. If the piston is aluminum a wrist pin which seems tight can be loosened by plunging the piston into boiling water, after first having removed the locking device.

Removing piston pin bushings, if they are of the oscillating type, can be accomplished by the same process as mentioned in the removing of wrist pins. A reamer may also be used and the bushing reamed out, if the idea is to renew the bushing. If the bushing is slotted carefully with a hack saw while the piston is held in a vise it will be easy to drive out.

Removing the bushing in the upper end of the connecting rod is sometimes a difficult task. This can be successfully accomplished in several ways, the most

common of which is to open the jaws of a vise far enough so that the end of the connecting rod rests upon them and at the same time gives sufficient clearance for the bushing between as it is driven out. A bar of brass or steel of suitable diameter is used to drive the bushing out.

Another way to remove a connecting rod bushing is to open the jaws of the vise wide enough to admit a piece of pipe slightly longer and larger than the bushing to be removed. They should be open wide enough to admit also the end of the connecting rod, and a steel bar, in size the diameter of the hole in the connecting rod and slightly longer than the bushing to be removed. By simply tightening the vise the bushing is forced out by the steel bar into the pipe.

Lower connecting rod bushings or bearings will be treated under the subject of "Motor Bearings."

The crankshaft is a solid, one piece steel forging. The pins and journals are turned to approximately the correct size with a lathe and are finished in a grinder to correct size within one thousandth of an inch.

If one side of the crankshaft is heavier than the other side there will be some vibration when the engine runs at high speed, although the shaft may be in stag balance, that is, may not appear heavier on one side than on the other when placed on a pair of parallel knife edges or on a pair of ball bearings. It may tend to whip out of line slightly, when run at high speed. Each crank pin on the crankshaft tends to pull harder in its own direction, exerts heavier pressure on the bearings, and tends to pull the shaft more out of line as the speed of the engine increases. This tendency is offset in some engines by the use of counter-balances or counter-weights which are bolted or electrically welded to the crankshaft.

The purpose of the crankshaft is to change the reciprocating motion of the piston to the rotary motion of the shaft and fly wheel.

There is practically nothing in connection with the care of the crankshaft except to keep it properly lubricated to keep the bearings properly taken up. The subject of lubrication and bearing fitting is taken up under a separate heading.

There are few repairs to the crankshaft which the ordinary mechanic can accomplish. When the engine has been taken down, the crankshaft can be measured with micrometer calipers to determine whether any of the pins or journals are worn out of round. A shaft which is worn undersized or out of round can, in the base repair unit, be put in the grinder, all the pins and journals trued up to within ten-thousandths undersized or twenty-thousandths undersized, and new Babbitt can be fitted to the engine base, or rod and bearing out of line reamed to fit the shaft. This will be explained later.

Sometimes the welding of the crankshaft is attempted. In most cases the attempt proves unsuccessful because the metal on both sides of the weld is weakened by being burned and it is almost impossible to weld a shaft so that it will be true without having a light cut taken off each bearing. If the crank is bent or sprung slightly in service it may not be visible to the eye except when the shaft is revolving between centers on a lathe with a tool or other object held stationary close to the center bearing. If it is only slightly out of true, proper fitting of the bearing is almost impossible.

A shaft is sometimes straightened between centers in a heavy engine lathe or by being supported by its ends between suitable blocks under an arbor press. It is even possible to improvise a straightening process with timbers or a heavy automobile jack. Assuming that the shaft is bent, if it be sprung in the opposite direction with a bar, and while reld in that position the center main bearing is struck a sharp blow with a hammer, the bearing surface being first

protected by a piece of brass or other available metal, the tendency of the shaft will be to straighten. This operation should not be attempted except in a heavy engine lathe. A suitable block should be procured upon which leverage may be obtained in using the bar. This operation is repeated again and again, a test being made each time the shaft is sprung. In making these tests one should not be misled by a bearing surface of the shaft that is probably worn out of round; the test should be made at the side of the bearing where little or no wear is liable to take place. And even then it is not the best thing for the lathe. In the base plant, if the shaft is bent very badly, it would be turned down to one of several accepted, undersized dimensions.

It is generally a long and tedious job, depending greatly upon chance and the ability of the operator of the bar to guess the proper amount of pressure to apply and the proper place to apply it. Where there is a machine shop in connection with the auto repair shop, the straightening of bent crankshafts would come under its routine work.

The crankcase may be used as a fixture for testing the alignment of the main bearings of the crankshaft with little difficulty. The case is placed on the bench and a strip of pasteboard about 1/64 of an inch thick placed beneath the front and rear bearings of the crankshaft. By these the shaft is raised from the center bearing and side play prevented. A pointer is then clamped on the side of the case at the center bearing, and by turning the shaft the amount it is out of true is determined. This method is quicker than testing in a lathe and can be used to advantage when without machine shop facilities.

A scored crankshaft. When the engine has been disassembled the crankshaft should be examined. If any rings or ridges can be seen or felt, the crankshaft should be held in a vise between grooved wooden blocks and carefully "emery clothed." To do this properly, some fine emery cloth should be torn into strips about 1½ inches wide and well oiled and the crank rubbed. Emery tape is better for this work when obtainable. If the emery cloth completely encircles the shaft, and a long steady movement be imparted to it, there will be no tendency to make the shaft oval.

It may be found that a crank pin is not only scored, but on testing it with calipers it is found out of true, i.e., not perfectly circular. The usual and best plan is to have the shaft ground true on a special grinder, but this may not always be possible, owing to the lack of facilities.

The best alternative is to first file the untrue parts of the shaft with a very smooth file to as accurate a circular shape as is possible, testing frequently with calipers. A lead "lap" is then made in a set of clamps or an old rod and bored out to size to fit the crank pin. Paper or card shims are inserted between the two halves of the "lap" so that the halves can be gradually closed down by the bolts onto the crankshaft. The "lap" is dressed with fine emery and oil and worked around the crank pin by hand until a good surface is obtained.

The flywheel of an internal combustion engine is made of cast iron or semi-steel. Some manufacturers of high speed motors encircle the flywheel with a steel band to eliminate the possibility of it "throwing" to pieces at high speed due to centrifugal force.

In an automobile engine the pressure that operates from the combustion acts only on one side of the piston forcing it to slide only one way. After being forced downward, the piston must be brought upward again and this is done by the flywheel, which is attached to the end of the crankshaft. When once started the flywheel continues to revolve until friction or some other resistance stops it; but before this can happen, the pressure is again exerted, keeping it going. The flywheel being attached to the crankshaft, they re-

volve together, and because the piston is connected to the crankshaft by the connecting rod, it moves with them. The piston moves downward by pressure, starts the crankshaft and flywheel, and then the flywheel in continuing to revolve, moves the crankshaft and piston.

Because a gasoline engine does not operate with a continuous pressure, during its action the piston first moves the crankshaft and flywheel, and then the crankshaft and flywheel move the piston.

The fitting of the crankshaft to the flywheel. It is essential that the flange of the crankshaft and the depression in the flywheel to receive it, be machined to fit perfectly. If there is any variation in these two diameters, the bolts which hold these two units together will soon loosen and a pound or knock will result. The proper machining is taken care of by the manufacturer and it is seldom that this condition arises. However, such a knock sounds very much the same as the pound of a crankshaft main bearing.

Cutting teeth around the outside diameter of the flywheel into which the pinion of the electrical starting device may mesh, has become a popular practice among manufacturers using electrical starting equipment. Sometimes the teeth are cut into the large ring gear which is bolted to the flywheel.

On nearly all automobile engine flywheels, markings will appear on the circumference surface of the flywheel, which indicate the position the crankshaft is to be placed for correct setting of the valves. These markings are different on nearly every make of car and the manufacturer's instructions pertaining to them must be followed.

A cooling system is necessary for the proper working of a gasoline engine, because otherwise the very high temperature produced by the combustion of the gases in the cylinder would make the piston and cylinder red hot. This would, of course, destroy the lubrication and cause the pistons to freeze, and would cause ignition of the mixture of fuel and air as soon as it entered the cylinder, or at least before the end of the compression stroke. This is avoided by providing a cooling system, which consists of water jackets in which the water circulates about the cylinder wall and valves, a radiator for cooling the heated water, and some means of circulating the water through the system.

Engine cylinders are sometimes cooled by air, particularly on motorcycle and light weight revolving cylinder airplane engines. Practically all trucks and cars used by the United States Army are water cooled.

Water cooling systems are divided into two classes, the forced circulation and the thermosyphon circulation. The latter is seldom used on trucks. In the thermosyphon system the water which becomes heated in the jackets surrounding the cylinders, since it is lighter than the cold water in the radiator, flows upward into the top of the radiator, and is replaced by cold water which flows from the bottom of the radiator into the jackets. This is exactly the same principle as is employed in circulating water from the back of a stove to the water tank in the hot water system in the kitchen.

In the force system a pump, which may be driven by gear, chain or belt, draws the water from the bottom of the radiator and forces it through the water jackets around the cylinders and out into the top of the radiator. Where it flows down through the radiator it is cooled before reaching the pump again to travel the same path. A fan, which is generally belt driven, is provided to draw the air through the radiator and is necessary to secure sufficient cooling, especially when the truck or car is driven with the wind or when it is operated in low gear.

Proper temperature of cylinders has much to do with efficiency and smoothness of engine operation. If the cylinders are too hot, the engine will pound

and the lubrication will not be satisfactory. If the engine is too cold the fuel economy will generally be poor and the engine will not operate smoothly. If the temperature of the water is kept as high as possible without the danger of boiling, better economy and smoother running will result. If, after the engine has made a long, hard pull, the radiator is so cool the hand may be placed on top of it without discomfort, it is almost a certain indication that fuel is being wasted.

The motometer or radiator-thermometer is used to indicate the radiator temperature, and its purpose is to prevent serious trouble by informing the driver that the water is boiling or that the water is too cool for efficient operation.

A device known as a thermostat is sometimes provided for regulating the temperature of water which circulates around the cylinders. It prevents the water from flowing through the radiator and becoming cooled until the desired temperature has been reached, which it maintains. Sometimes a permanent shutter arrangement or simply a curtain or piece of cardboard is used to cover a portion of the radiator and prevent over-cooling of the engine in cold weather.

The radiator for a truck may be of either honey-comb or tubular construction. The cellular or honey-comb radiator is composed of a great number of cells through which the air is drawn by the fan or passed through due to the speed of the machine. The construction of a honey-comb radiator is rather delicate, and when such a radiator is used on a truck it is generally supported on special springs to relieve it of part of the road vibration and some of the twisting action to which it would be subjected if rigidly bolted to the frame.

Tubular radiators may be made with a great number of vertical tubes provided with a series of continuous horizontal fins to increase the cooling effect, or each tube may have independent fins.

Recently a great number of truck manufacturers have adopted radiators built with removable top and bottom plates to permit easy inspection, cleaning and repair.

Care should always be taken to avoid filling the radiator with water which contains too much lime or scale forming matter. Water which produces a thick deposit of lime in a tea kettle will do the same in the water jackets and probably in the radiator.

The stuffing boxes or glands on the water pump should be kept properly adjusted, that is, just tight enough to prevent leakage. The grease cups for lubricating the pump shaft should be given proper attention faithfully every day.

Boiling of the radiator is an indication of some form of trouble. This trouble may be due to a great many causes outside of the cooling system. Driving with the spark lever in retarded position (or with the spark advance rod disconnected), or prolonged driving in low gear will generally cause boiling. A mixture entirely too rich or entirely too lean may be the cause of boiling. A loose fan belt, a broken paddle wheel in the water pump, or an insufficient supply of water in the radiator might also cause boiling. Obstructed exhaust pipe, a dirty muffler, improper valve timing, may also have the same effect. In zero weather over heating is generally the result of frozen radiator, frozen water pipes, or inoperative water pump.

As for cooling system troubles, the majority of them can be warded off if a certain amount of care is exercised in operating the car.

However, it will be well for us to refresh our minds with the most important troubles concerning radiation. Starting with the radiator, the frequent trouble is the leak, and, depending upon the time element, also the amount of damage, it can be repaired in the following manner:

If it is a slight leak the tube can be closed by a pair of pliers; if the seams of the tube open, it will require a section for a new tube. The most important repair work in connection with radiators is soldering and one must be quite an expert to make a satisfactory repair. On the Class "B" Military Truck, if the tubes leak the cast iron header is removed and the tubes are flanged so they will conform with their seat in the shell casting. In repairing the radiator as I previously mentioned, it depends entirely upon the nature of the repair; for instance, I have had occasion to use small, white pine plugs, inserting them in the section, and when they became water-soaked they expanded and choked the leak. In this manner entire sections can be blocked off making a very substantial temporary repair.

Next to the radiator, hose connections at times are troublesome. Emergency repairs, such as taping the manifold, and then giving it a coat of shellac, down to replacing the hose, do not require very much consideration, as it does not need skilled mechanics to do this any more than to say that these connections should be thoroughly inspected quite regularly.

In the water pump we sometimes meet with such repairs as broken impellers or gears, sheered shafts and stripped packing gland nuts. In former cases the shaft gear or impeller must be replaced and its indication is a very hot motor with a remarkably cool radiator, but where the stuffing box nut is damaged it can be temporarily repaired by peening. Should the packing gland require new packing, the nuts are simply backed off, the packing placed around the shaft, so that the packing is wrapped in the same direction that the nut is turned when replaced and tightened up. As we have already mentioned, the tightening of this nut should be just enough to stop the leak. Briefly, we have outlined the general troubles, and the shop practice on this subject will enable you to make these repairs.

The purpose of the carburetor is to supply a mixture of a finely atomized spray or a vapor of gasoline (or other suitable fuel), and air, in the proper proportion to burn in the cylinder of the engine. Since this mixture must have definite proportions of fuel and air to burn completely, the carburetor must maintain the proper quality at all times. Too large a proportion of gasoline will result in the escape of some unburned fuel and in the deposit of a small amount of unburned carbon in the cylinder. Too large a proportion of air, on the other hand, will result in some loss of power because the explosions will be weaker. The mixture of about 15 parts of air to one of gasoline by weight, is correct for complete combustion, and should give maximum power. A somewhat leaner mixture will give better economy, but at the same time will give noticeable loss of power. Since it is impracticable to weigh the mixture of fuel and air, the operator adjusts the carburetor according to the behavior of the engine.

Figure 1 of this lecture represents some of the parts of a very simple carburetor. The gasoline from the tank flows through the fuel line through a screen or strainer past the float needle into the float chamber. When the gasoline raises the float to a certain height in the float chamber, the float, by means of a suitable lever or arrangement of levers, closes the needle valve and prevents the entrance of more gasoline until some has been used.

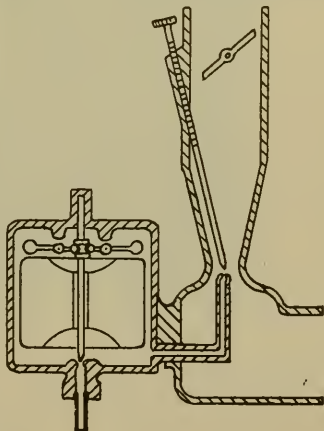


FIG. 1.

As the pistons travel downward in the cylinder on their suction strokes, the air which enters the bottom of the carburetor is drawn through the mixing chamber past the spray nozzle at a velocity so high that it sucks up a spray of gasoline from the tip of the spray nozzle. In the carburetor shown the mixing chamber is smaller than the main body of the carburetor so that air will pass through at a high velocity, even when the throttle is nearly closed and the engine is running slowly. The size of the opening in the tip of the nozzle can be adjusted by screwing the needle valve up or down to regulate the proportion of fuel to air. The throttle can be opened or closed to regulate the quantity of charge drawn into the cylinders.

If an engine fitted with this carburetor is primed, started and warmed up, and the throttle is nearly closed in an effort to make the engine run slowly the quality of the mixture, or the proportion of fuel to air can be adjusted by screwing the needle valve up or down. If the needle valve is screwed down too far the engine will miss and "pop back" and if it is set too lean will probably die out entirely. This popping or back-firing takes place because a very lean mixture burns so slowly that there is fire in the cylinder when the fresh charge comes in at the beginning of the next suction stroke. If the needle valve is opened more the engine will run smoothly when the proportion of fuel to air is somewhere near correct. When it is opened still wider the mixture becomes too rich and the engine runs at a slower speed; if it becomes still richer, the engine will misfire and race or lope with sooty black smoke issuing from the exhaust pipe and if the priming cup is open the issuing flame will be yellow instead of blue or purple.

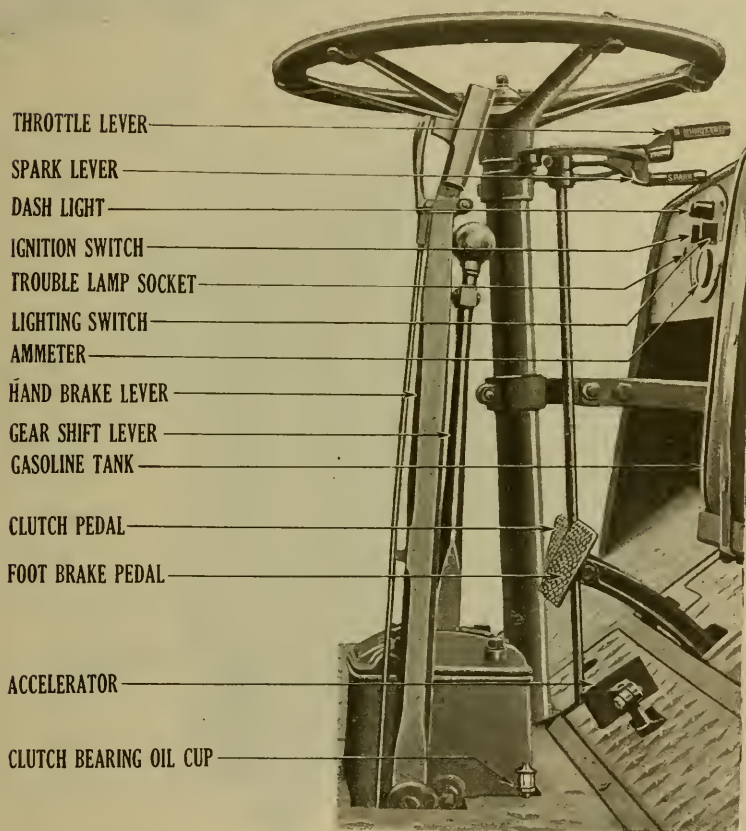
If, after the needle valve has been adjusted to give the best quality of mixture, with the throttle nearly closed and the engine running slowly, the throttle is opened wide to make the engine run faster or pull a greater load, a larger volume of air will pass through the throat of the venturi tube or mixing chamber with very much higher velocity and the quality of the mixture will become entirely too rich. If, on the other hand, after the needle valve has been adjusted to secure the best possible qualities of mixture when the engine is running fast and the throttle is wide open, the throttle is closed to make the engine run slowly, the mixture becomes entirely too lean and the engine dies out.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
THEORETICAL AUTO ENGINEERING

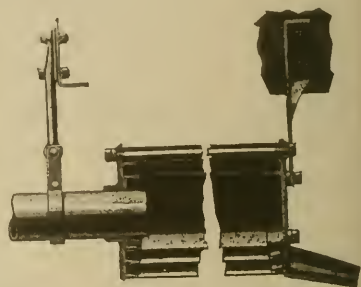
LECTURE IV

CHASSIS CONSTRUCTION



OPERATING CONTROLS

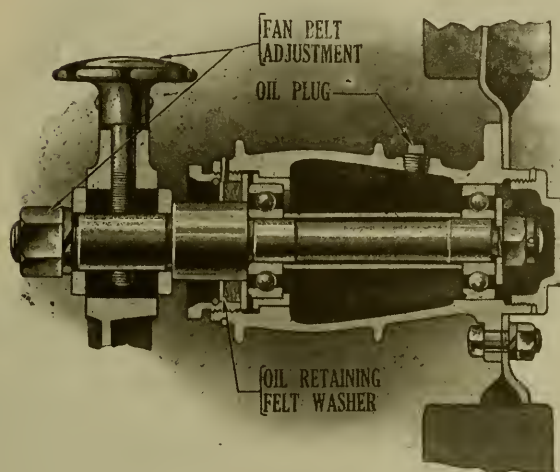
Muffler.—It may be necessary occasionally to remove the muffler for a thorough cleaning if it becomes clogged up with carbon so as to cause back pressure and loss of power. A satisfactory temporary remedy, however, can be effected by tapping it all over with a mallet, which will knock loose much of the sooty accumulation so it can be blown out the tail pipe.



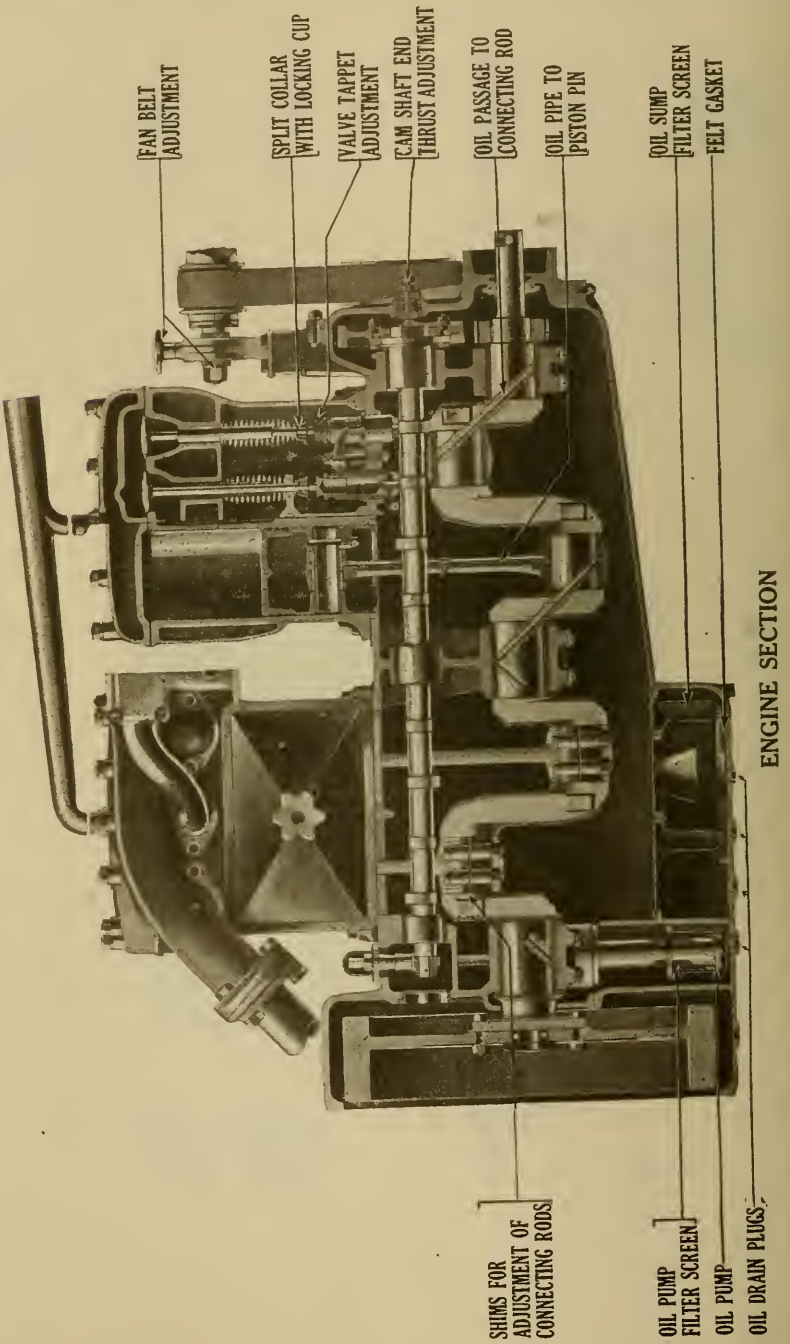
MUFFLER

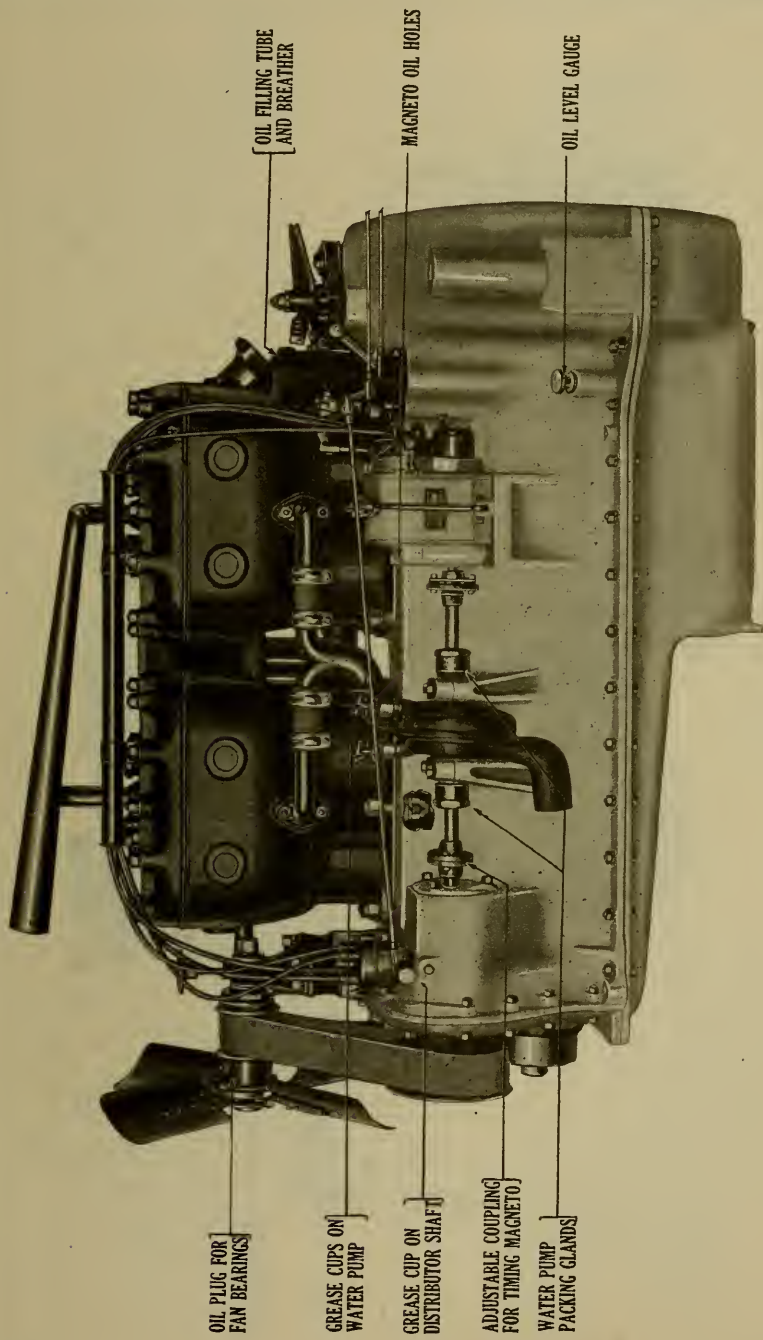


Radiator



Fan





OIL PLUG FOR
FAN BEARINGS

GREASE CUPS ON
WATER PUMP

GREASE CUP ON
DISTRIBUTOR SHAFT

ADJUSTABLE COUPLING
FOR TIMING MAGNETO

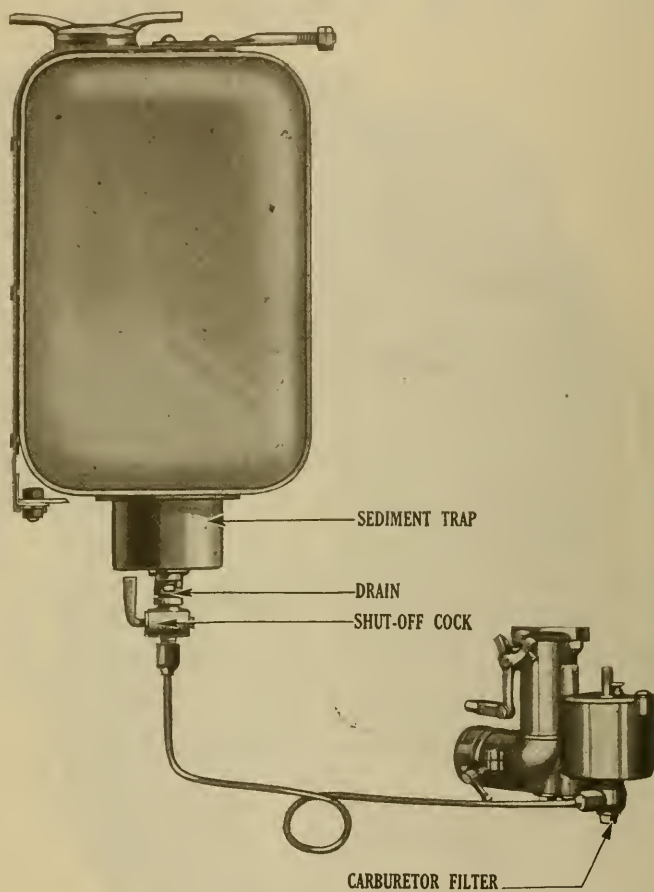
WATER PUMP
PACKING GLANDS

OIL FILLING TUBE
AND BREATHER

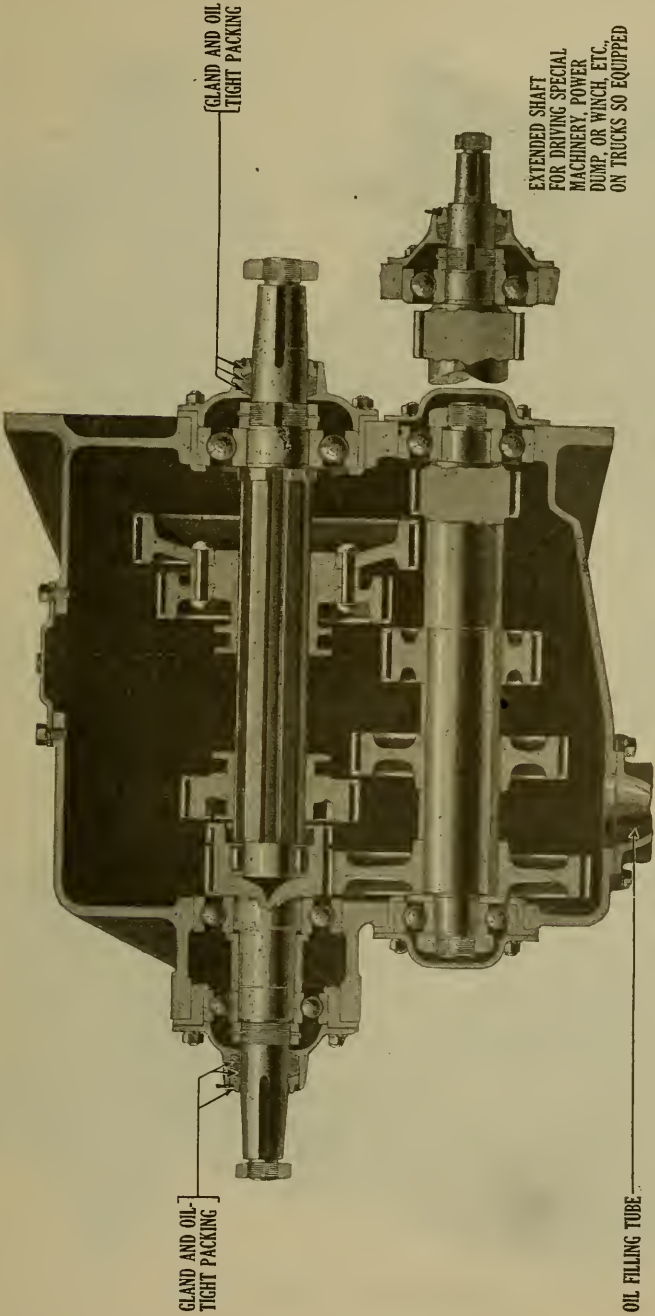
MAGNETO OIL HOLES

OIL LEVEL GAUGE

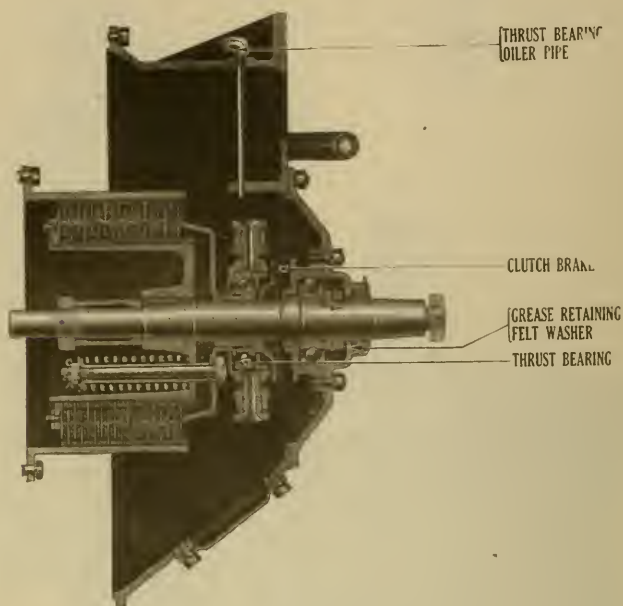
ENGINE, LEFT SIDE



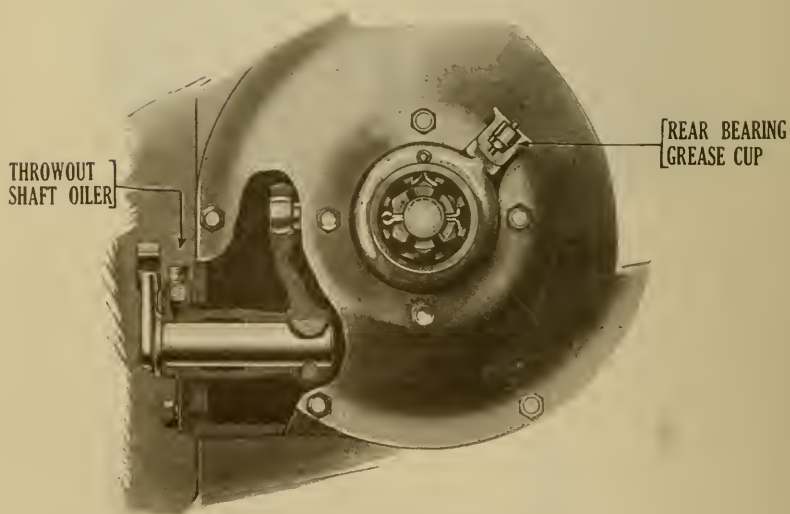
GASOLINE SYSTEM



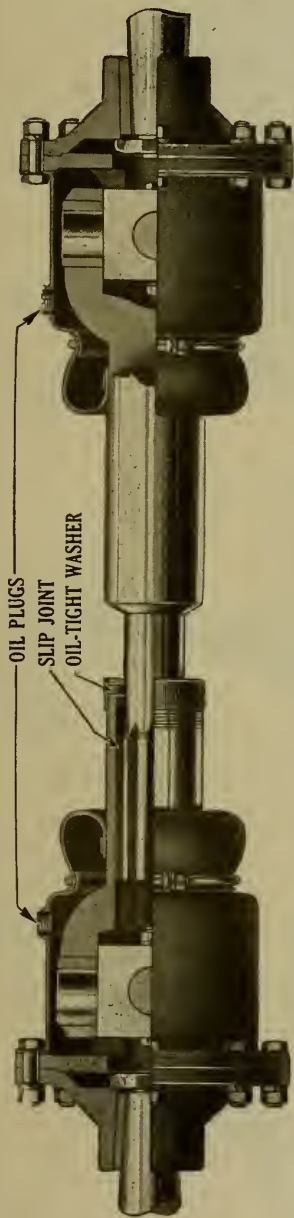
TRANSMISSION



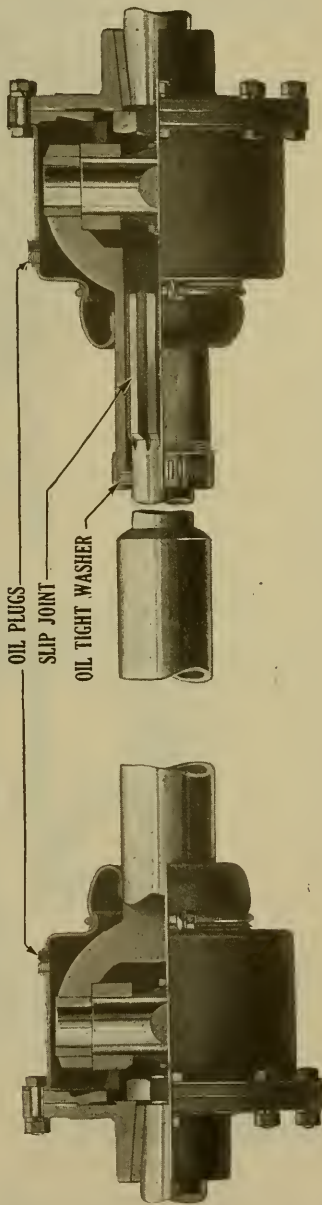
Clutch Section



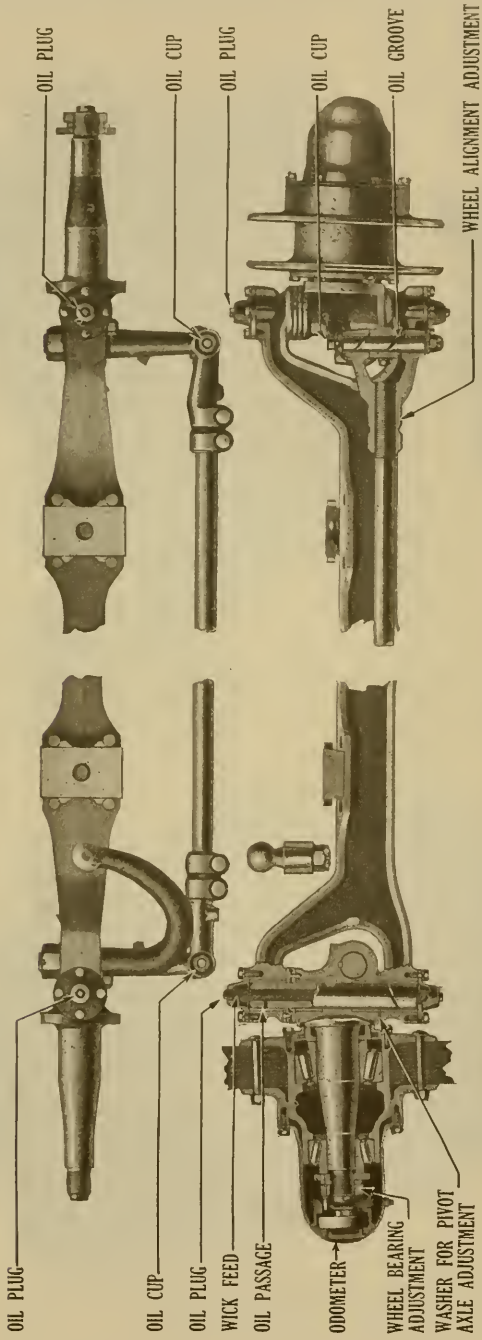
Clutch Housing and Throwout



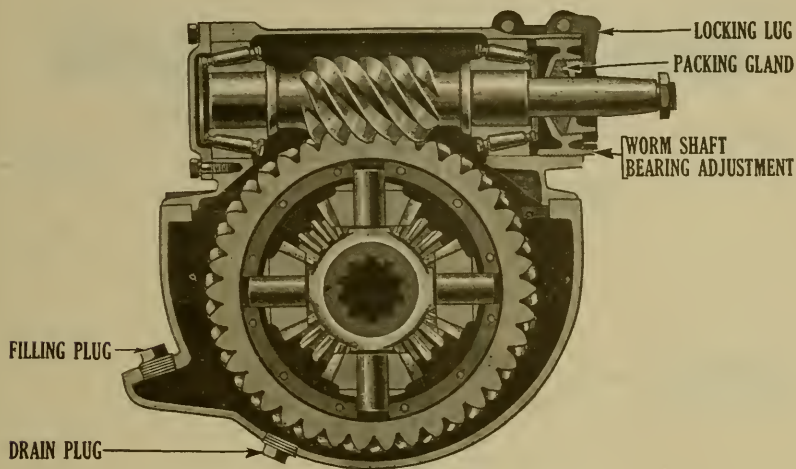
Front Propeller Shaft and Universal Joints



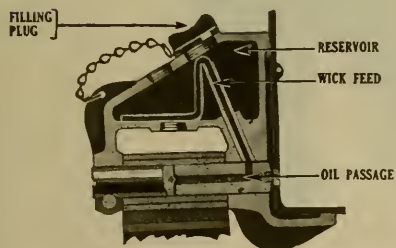
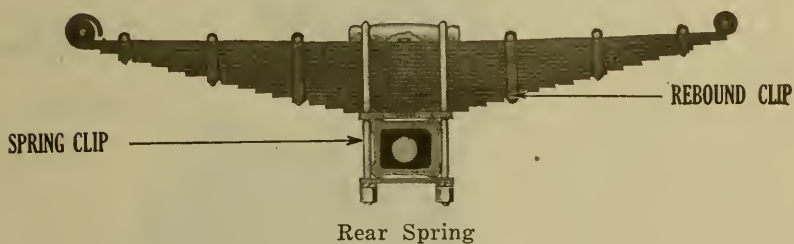
Rear Propeller Shaft and Universal Joints



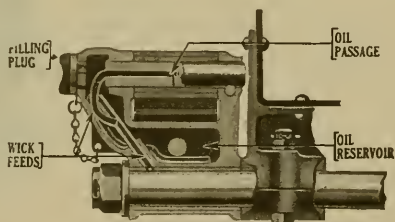
FRONT AXLE



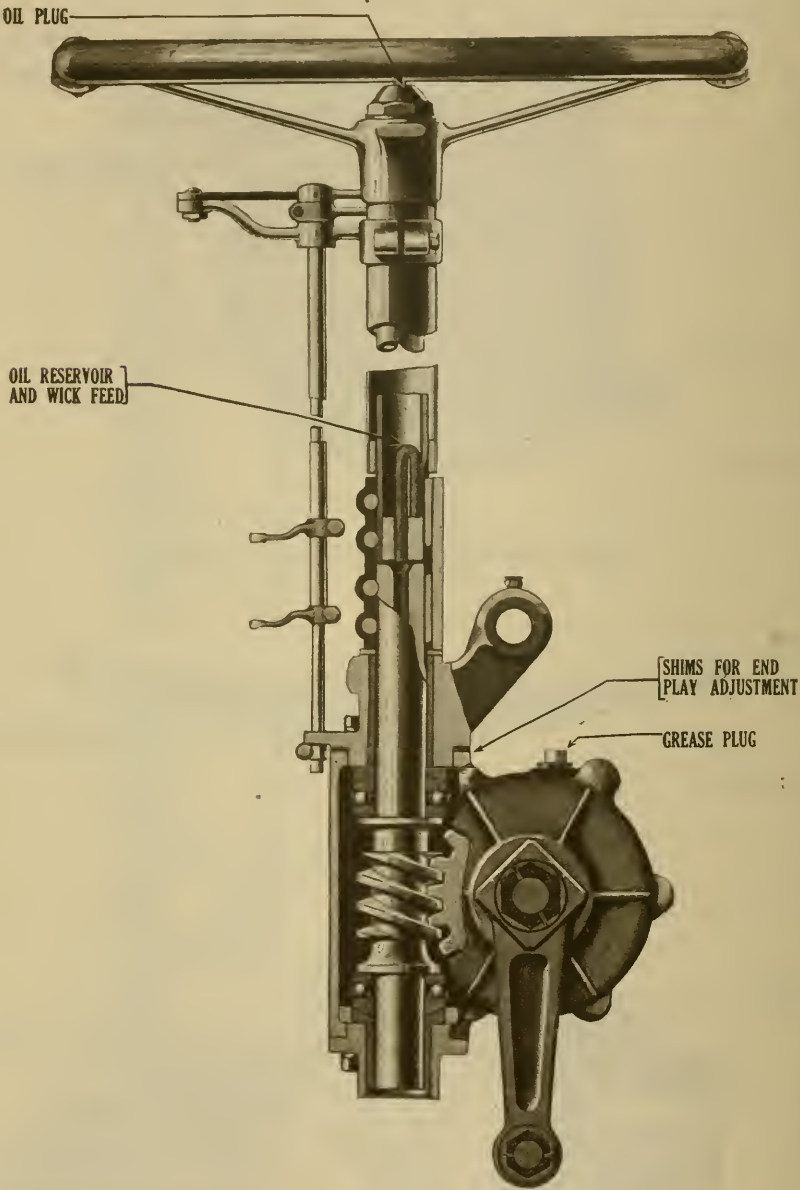
DIFFERENTIAL AND WORM GEARING



FRONT HANGER



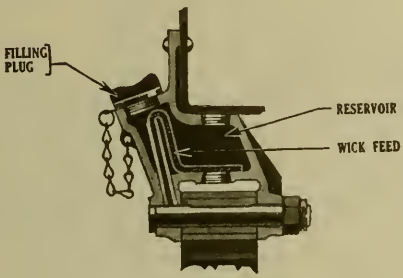
REAR HANGER



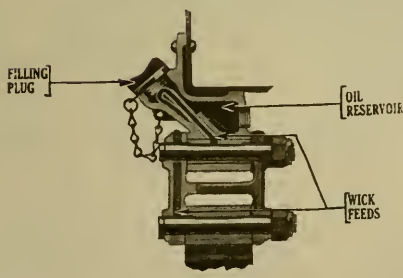
STEERING GEAR



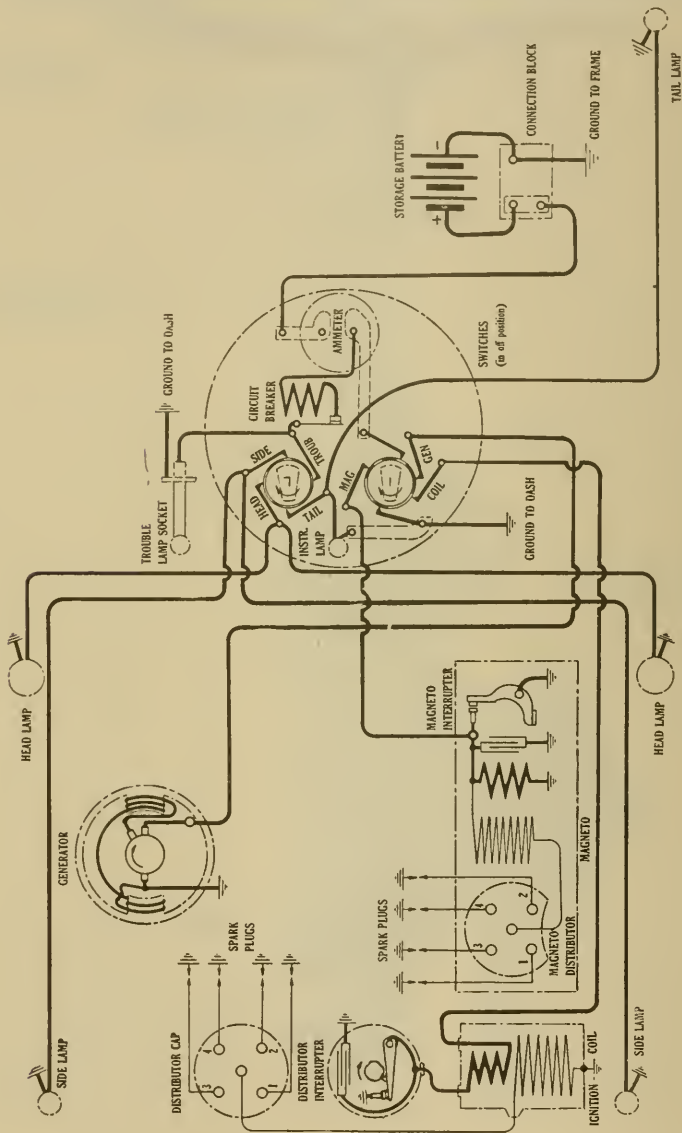
FRONT SPRING



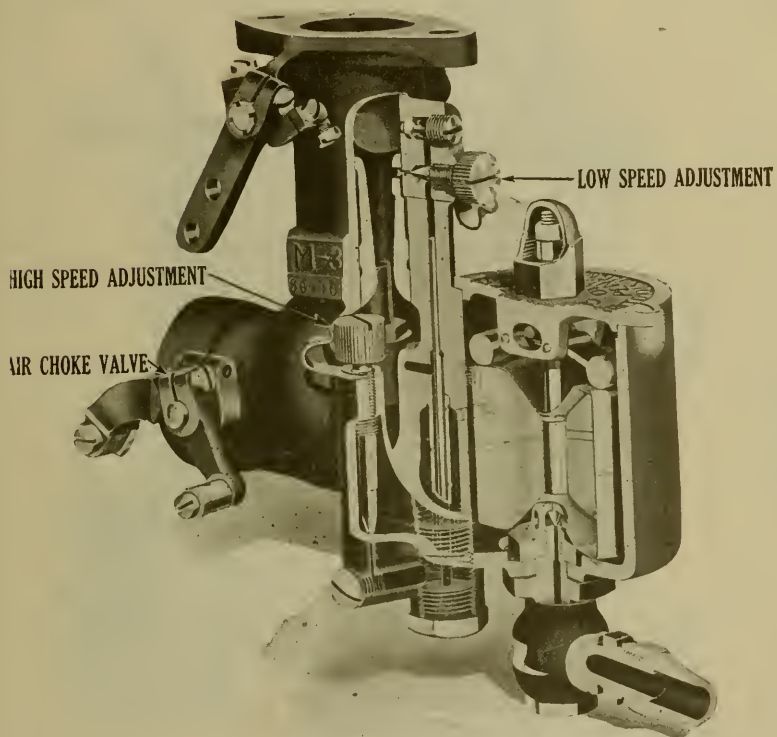
FRONT HANGER



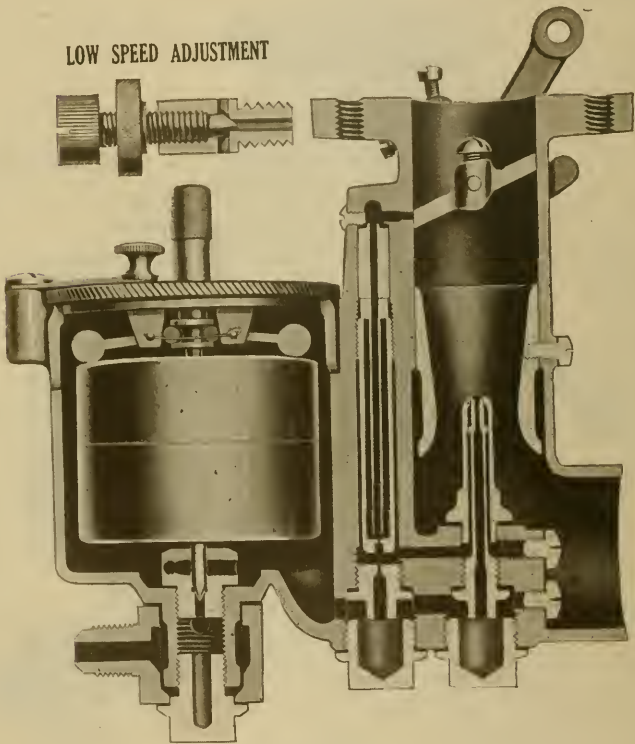
REAR HANGER



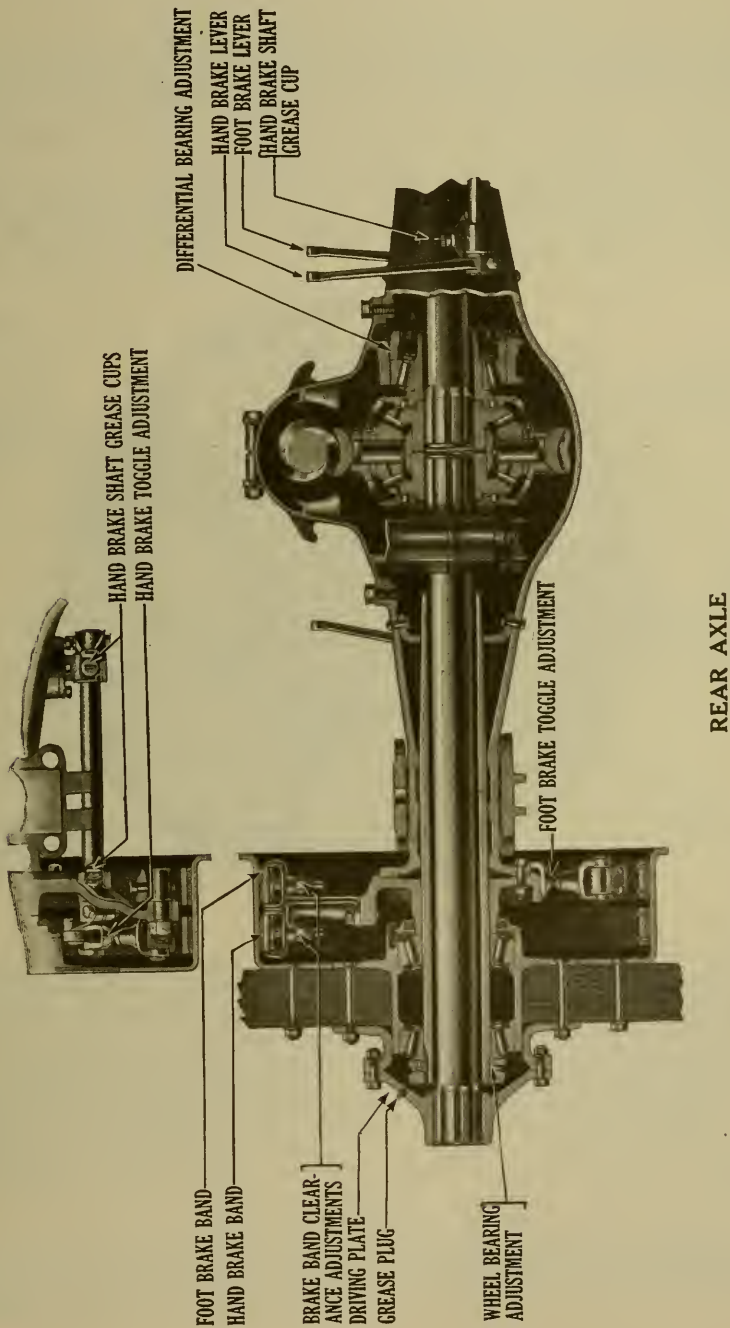
Wiring Diagram



Stromberg Carburetor



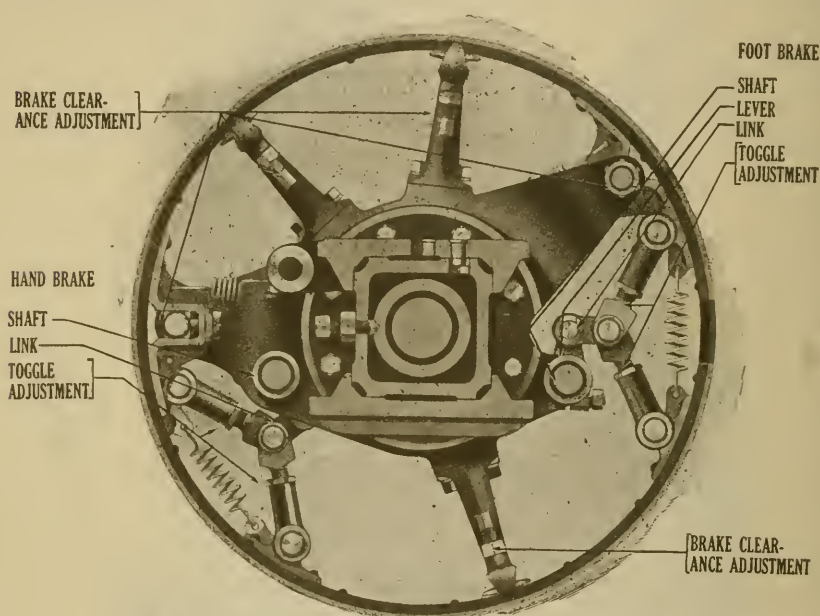
Zenith Carburetor



BRAKES

There is no part of a truck more neglected by the average driver than the brakes. They are of the utmost importance, however, and there should be no disregard of the precautions necessary to insure their dependable condition at all times. Under ordinary usage the brakes do not require any particular attention other than regular oiling of the connections and turning down the grease cups provided for the brake-shaft bearings.

Both sets of brakes are equalized, but this does not mean that, whether the brake be properly adjusted or not, the action will be the same for either wheel. On the contrary, it is important to see that the brake-shoe clearance is kept uniform for both wheels.



BRAKES

Brake Adjustment.—It is very important when brake adjustments are made to take care not to get them so tight that they will drag, as a dragging brake not only gets hot and wears out rapidly, but also absorbs considerable power.

With both wheels jacked up and both brakes completely off adjust the brake shoe so it has a clearance of 0.010 inch all the way around the brake drum, then adjust the toggles so that when the brake is pulled up tight the pin connecting both toggles to the lever will lack 2 inches of coming in the line of the pins at the brake-shoe ends of the toggles. Set the lever to which pull rod attaches about 15° back of center, so that when brake is applied it will be pulled up straight.

TRANSMISSION

To keep the transmission in continual good working order and minimize wear in its parts, it is necessary, first, to keep it filled with the proper lubricant,

and second, to master the art of slipping from one speed to another without clashing the gears, which may result in chipping the teeth.

If you are careful in shifting gears, the transmission will require no mechanical adjustment and the only attention necessary will be to drain and refill the case with fresh lubricant after the first 1,000 miles and every 5,000 miles thereafter.

Small metallic particles are worn off the gear teeth and this grit, which is destructive to the gears and bearings, mixes with the lubricant, making it necessary to always remove the oil as above. After draining the case, flush it out with kerosene to make sure that all the gritty oil is out of the bearings. The case should then be filled to the level of the filling spout on the left side with 600-W steam-engine cylinder oil.

In replacing the cap be sure to fasten firmly and be very careful not to let any dirt get into the housing.

UNIVERSAL JOINTS

There are two universal joints between the clutch and transmission and two on the propeller shaft between the transmission and rear axle. All joints are inclosed in a housing and packed with heavy oil such as 600-W steam oil or Writmore's compound. Every 1,000 miles remove the plugs in the side of the cases and force the lubricant in with an oil gun.

FRONT AXLE

Inspect the front axle and steering connections daily for looseness and wear. Looseness in the steering cross tube and the steering-gear connecting tube must be taken up immediately.

On trucks equipped with grease cups at these points the grease cups must be turned down every day until the grease oozes from the joints.

Where wick-feed oil cups of large capacity are supplied, daily lubrication is not necessary, but they must be kept well filled with oil at all times.

Pivot-Axle Adjustment.—To provide for taking up vertical play in the steering knuckles, the washers at the bottom may be removed and replaced with slightly thicker ones. There are three thicknesses of these washers with 0.020 inch difference between them.

STEERING GEAR

Remove the plug in the steering-gear housing every 1,000 miles and force in grease with a grease gun. The plug in the top of the steering column should be taken out every 250 miles and engine oil forced down with an oil gun.

The steering gear can be adjusted for wear, but all lost motion apparent in the handwheel is not necessarily due to the steering gear and before changing the adjustment of the steering gear it is advisable to examine all the steering connections and make sure that the lost motion is not due to looseness of these parts.

Adjustment.—Two shims where the steering column bolts onto the steering-gear housing provide a means of taking up end play of the worm shaft.

Do not under any consideration tighten up the steering-gear adjustment to a point where the wheel turns hard. A tremendous pressure can be placed upon the steering gear by too close an adjustment, which will bind the working parts, cause excessive wear, and make steering difficult. The ball-thrust bearing is

especially apt to be seriously damaged or even broken if the steering gear is adjusted too tightly.

When the worm gearing is badly worn, remove the steering arm and turn the steering wheel until the worm wheel has made a quarter revolution, bringing into use a new and unworn segment of the worm wheel, then replace arm.

BEARINGS

The wheel bearings should be greased every 1,000 miles and the hubs cleaned out and packed with fresh grease every 5,000 miles.

When removing the wheels or adjusting the bearings, remember that the nuts holding on the wheels on the right side of the truck are right-hand nuts, while those on the left side have left-hand threads.

Bearing Adjustment.—Both front and rear wheels run on tapered roller bearings and great care must be exercised not to get them too tight. These bearings will revolve even when adjusted very tightly, but this is sure to damage the bearings and may ruin them in a few miles.

The best method is to set the bearing up tight and then revolve the wheel a few times by hand, which overcomes any tendency to "back-lash." Then back of the adjusting nut about one-sixth of a turn, so that by grasping the opposite sides of the tire you begin to feel a very slight shake in the wheel. There should be a barely perceptible looseness. If, after you have adjusted a bearing to a point that is apparently correct, the locking device can not be placed in position without changing the adjustment, it is far better to loosen the nut until it can be secured with the locking device than to tighten the bearing adjustment.

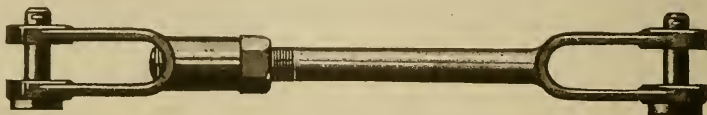
WHEELS

Keep the bolts through the hub flanges (on wood wheels) tightened up at times. A wheel will go to pieces rapidly if these bolts become loose. The bolts attaching the brake drums to the rear wheels should also be inspected occasionally for looseness.

Wheel Alignment.—The front wheels may be thrown out of alignment by striking some heavy obstruction in the road. This not only makes steering more difficult, but is also hard on tires and bearings and the wheel itself. The front wheels should "toe in" slightly. A difference of $\frac{1}{8}$ to $\frac{3}{8}$ inch between the front and rear of the rims when the wheels are straight ahead is correct.

CLUTCH

Adjustment.—When the clutch is engaged the pedal, if it is properly adjusted, will have at least $\frac{1}{2}$ inch of clearance from the under side of the floor board. If the pedal is allowed to touch the under side of the floor board the



CLUTCH PEDAL ADJUSTMENT

effect will be the same as when driving with your foot resting on the pedal; the clutch will slip and the thrust bearing in the throw-out yoke will suffer. The connecting link between the pedal and clutch throw out is provided with

an adjustment by which the proper clearance between the pedal and foot boards can be maintained. This is the only adjustment necessary as the springs automatically take up the wear on the clutch surface.

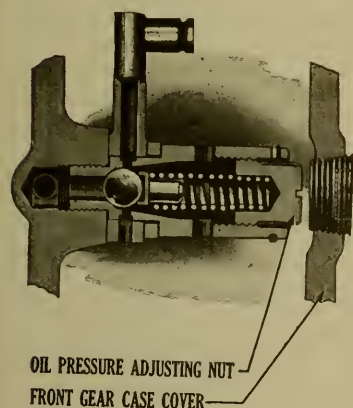
Lubrication.—There are three places to lubricate the clutch, all of which must be attended to daily:

1. The oiler coming up beside the hand levers lubricates the thrust bearing of the clutch throw-out.
2. The throw-out shaft is oiled through the cup on the left side of housing where throw-out shaft enters.
3. The grease cup placed at the rear of the housing lubricates the ball bearing at this end of the clutch and must not be neglected although it is not very accessible.

The clutch plates need no lubrication. It is absolutely necessary to oil clutch bearings *every day*.

Clutch Brake.—The clutch is provided with a brake which is brought into action when the clutch pedal is pushed clear down. This slows down the clutch and makes it easier to shift from a lower speed to a higher. When coasting with the clutch disengaged, avoid holding the pedal down hard as this will quickly wear out the facing of the clutch brake.

Replacing Oil Pan.—Inspect the gaskets and replace if necessary, making sure the surfaces of oil pan and crank case are clean and smooth and free from dried shellac or portions of the old gasket.



A felt gasket is placed at the bottom of the sump to prevent the funnel fastened to the steel plate from rattling. See that this felt washer is kept in position when assembling.

Place blocking or a jack under the oil pan to hold it in place while fastening, but do not put any pressure under it. In bolting the oil pan in place, do not draw one nut up tight and then the next, but tighten them all up evenly and a little at a time.

Adjustment of Valve Tappets.—Always use two wrenches when tightening or loosening lock nuts on valve tappets to prevent shearing the pin and twisting the tappet in its guide. The valve tappets should be adjusted when the engine is warm. Use a gauge and do not guess at the clearance between the tappet and the valve stem. Be sure that the engine is turned so that the cam is not lifting the tappet you are adjusting above its lowest point. Adjust inlet-valve clearances to a uniform 0.004 inch and exhaust valves to a gap of 0.006 inch.

Grinding Valves.—The valves are of tungsten steel and do not require grinding frequently. Usually once every 5,000 miles is sufficient. Do not use too harsh an abrasive. Any good commercial valve grinding compound will be satisfactory. If none is obtainable, flour of emery No. 120 grade, mixed with

kerosene until it forms a very thin paste, will do. Apply pressure lightly and always directly from above, or valve seat will both be worn out of round. Keep the cutting material out of cylinders and wash valve parts and guides thoroughly with kerosene after the valves are ground.

Replacing Cylinder Heads.—Make sure that gasket is in good condition or replaced by a new one, if defective. Tighten the nuts up evenly and a little at a time. Before refilling cooling system, start the engine and allow it to run just long enough to get hot. It will then be possible to draw the nuts up tighter.

Gaskets.—See that all joints with gaskets are kept tight, otherwise they will blow out and leak. When separating joints having gaskets, be especially careful not to damage the gaskets and always make sure that the gasket is in perfect condition or replaced by a new one, if defective, before reassembling.

Cleaning Out Carbon.—Removing the cylinder heads to grind the valves affords an excellent opportunity for cleaning out any carbon deposits which may have accumulated. Carefully scrape off the carbon from all parts, brush the surface clean, and finally wash with kerosene.

Dosing the engine with kerosene or patent carbon removers does not remove carbon. Kerosene run through the engine by way of the carburetor just before grinding valves and scraping carbon will free up the piston rings. The lubricating oil must in this case be changed because of diluting with kerosene.

COOLING SYSTEM

The Radiator.—The radiator should be kept nearly filled with clean water as free as possible from lime and other impurities. In filling the radiator keep the screen in place in the filler opening to prevent foreign matter from getting into the system.

Avoid pouring cold water into a hot and nearly empty cooling system. Engine should first be allowed to cool.

CARBURETOR AND GASOLINE SYSTEM

Carburetor.—Adjustment of the carburetor is rarely necessary, and before changing any of its adjustments be sure that there are no obstructions in the gasoline line, or dirt or water in the carburetor, that manifold connections are absolutely tight and free from air and leaks, that valves and valve stems do not leak, and that there is good compression and a hot spark in all cylinders. The only things which justify a readjustment of the carburetor are: Extreme change in weather conditions, extreme change in altitude, or the use of an entirely different grade of fuel.

If the mixture is too rich, it will be indicated by black smoke discharged from the exhaust accompanied by a strong smell. The engine will be sluggish and slow to accelerate and have a tendency to overheat. Before changing the carburetor adjustment see if the air choke is not partially closed.

A lean mixture is indicated by backfiring in the carburetor especially when the motor is running slowly and the throttle opened suddenly; also by firing in the muffler when descending hills with the clutch engaged and by a lack of power and missing, especially at low speeds. This may be due simply to the fact that the engine is too cold.

Never attempt to adjust the carburetor unless the engine is well warmed up.

Adjustment of Stromberg Carburetor.—To set the high-speed adjustment, advance the spark to the position for normal running and open the throttle

to give a motor speed of approximately 750 revolutions per minute. Then turn down on the high-speed screw gradually, a notch at a time, until the engine begins to slow down. Then turn up the same screw until the engine runs at the highest rate of speed for that throttle opening.

To adjust the low-speed screw retard the spark fully and close the throttle as far as possible without causing the engine to stop. If when idling the motor tends to roll or "load" it is an indication that the mixture is too rich and therefore the low-speed adjusting screw should be turned out, permitting the entrance of more air into the idling mixture. The low-speed adjustment is best made by turning the screw in or out a notch at a time and carefully observing the smoothness with which the engine idles.

After satisfactory adjustments have been made with the engine running idle, it is most important and advisable to take the truck out on the road for further observation and finer adjustment. If upon rather sudden opening of the throttle the engine backfires, the high-speed adjusting screw should be opened one notch at a time until the tendency to backfire ceases. On the other hand, if when running along with open throttle the engine "rolls" or "loads" the mixture is too rich and the high-speed screw must be turned down a few notches.

Always set the adjustment for the leanest mixture on which the engine will run satisfactorily. This will not only save gasoline but will help to prevent carbon deposits, dirty spark plugs, pitted valves, and overheating.

Adjustment of Zenith Carburetor.—The low-speed adjustment is made the same way as with the Stromberg carburetor. Turning in the screw restricts the air entrance and gives a richer mixture. There is no high-speed adjustment for the Zenith carburetor, as this is determined by the size of the jets and air passages when the carburetor is made and can not be changed without installing new parts of different size.

Adjustment of U. S. A. Standardized Carburetor.—Although slightly different in construction, the directions for adjusting the Zenith also apply to the standardized carburetor, the idling mixture only being adjustable. This is regulated by manipulating the low-speed adjusting screw, as directed in the instructions for the Zenith carburetor.

Gasoline System.—The main gasoline supply is carried in the large tank on the dash. A reserve supply is carried in the tank under the seat, but as the reserve tank is not piped to the carburetor, its contents must be transferred to the dash tank in order to be used. Never fill the tanks while the engine is running. When filling the gasoline tanks be careful of open lights, because gasoline vapor travels.

Strain the gasoline, if possible, to separate all dirt and water which it may contain. Little particles of dirt may cause a great annoyance by getting into the carburetor, and even a small amount of water is sufficient to cause serious carburetor trouble, and if allowed to accumulate in sufficient quantities in cold weather may cut off the supply altogether by freezing in the pipe line or the small passages of the carburetor.

The drain cock in the trap under the gasoline tank should be opened for an instant every 250 miles to let out any foreign matter.

Remove the plug in bottom of filter under the float chamber occasionally to drain the carburetor and gasoline line. The screen should be removed and cleaned.

The supply of gasoline should be shut off at the tank whenever the truck is stopped for any length of time.

SPRINGS AND SHACKLES

Keep the spring clips tight. They must be examined daily. The wear between the leaves of the springs, especially when new, loosen the clips. Spring breakage is much more likely to occur if the spring is not held firmly to its seat.

Inspect the rebound clips frequently also and tighten or replace them if necessary.

These precautions are easily taken and will much prolong the life of the springs.

Every 5,000 miles jack up the frame of the truck to take the weight off the springs, remove the rebound clips, and, separating the leaves with a chisel or screw driver, lubricate between the leaves with a mixture of graphite and oil.

TIRES

The following points should be kept in mind in order to get the maximum service out of the tires:

1. Overloading and overspeeding causes excessive tire expense. Overwork takes the "life" out of rubber.
2. Remove oil and grease from the tires, as it decays the rubber.
3. Keep the tires from excessive heat. It destroys the wear-resisting quality of rubber.
4. Always get the truck under way before turning the steering wheel, or the fastenings of the tires will be strained.
5. Start and stop gradually. Sudden stops and starts are bad for the whole truck, but particularly hard on the tires.
6. Running along the street-car rails grinds down the edges of the tires.
7. Pick your way on the road, avoiding obstacles and road irregularities.
8. When storing the truck for any length of time, jack up the wheels to relieve the pressure on the tires.

Shifting Gears.—The 4-speed selective transmission is of the usual type and it is of course necessary to disengage the clutch before attempting to place any of the gears in mesh or shift from one speed to another.

The position of the lever to engage the various speeds is indicated by the numbers on the gear shift lever quadrant.

When starting the truck, if the first speed gears do not slip into mesh easily, do not try and force them. Let the clutch in until the gears are rotated slightly and try again.

Changing from a low speed to a higher requires that the engine be slowed down during the time the clutch is out and before engaging the next higher gear. A short pause in neutral before shifting into the higher gear allows the clutch to slow down, so that the gears will slip in quietly.

In changing from a higher gear to a lower, disengage the clutch and, shifting to neutral, allow the clutch to engage for an instant, at the same time quickly speeding up the engine; then release the clutch again and engage the lower gear.

When road or traffic conditions necessitate shifting to a lower gear, always shift soon enough and to a low enough gear to prevent the engine laboring.

Never attempt to engage the reverse before the truck has come to a dead stop. Not only would gear stripping be very likely to result, but there would be a heavy strain thrown upon other parts of the chassis.

The Pump.—The packing glands will need tightening up occasionally to prevent leakage. The gland nut on the forward side of the pump has a right-hand thread while the one on the rear has a left-hand thread; hence both nuts are turned in the direction in which the shaft rotates to tighten them up. A slight pressure is all that is necessary to prevent leakage. If screwed up too tightly, the pump spindle will not revolve freely and the packing will be worn unduly. A few drops of oil on the gland nuts will keep them lubricated and permit of easy adjustment.

Use candle wicking soaked with white lead for packing or any good standard packing and always remove the old material from the gland before applying the new packing.

Lubrication of Pump.—Grease cups on pump must be kept filled with hard grease and turned down daily not only to lubricate the bearings but also to preserve the packing and prevent leakage.

The Fan.—Remove the plug in fan hub every 250 miles and oil the fan bearings. Every 5,000 miles, dismount the fan, clean out hub and bearings and pack with fresh grease.

Fan Belt.—If too loose the fan belt will slip; if too tight the belt will not last long and needless wear on the fan bearings will follow. Maintain just sufficient tension on the fan belt to prevent slipping.

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LECTURE V
LUBRICATION

The purpose of lubrication is to reduce friction. Friction is the force which retards the movement of one surface upon another. Wherever two materials are rubbed together, the friction between them generates heat. This idea is made a little clearer when it is remembered that the Indians used to rub two sticks together until the friction generated enough heat to cause the sticks to take fire. The same idea applies to metals. No matter how smooth a piece of metal may appear to the unaided eye, if looked at through a microscope, it will appear as rough as a file. Naturally, the smoother or more polished the metal is, the less friction will be caused; but no matter how "finished" the metal, friction, heat and wear will take place, unless some lubricant is used to prevent it.

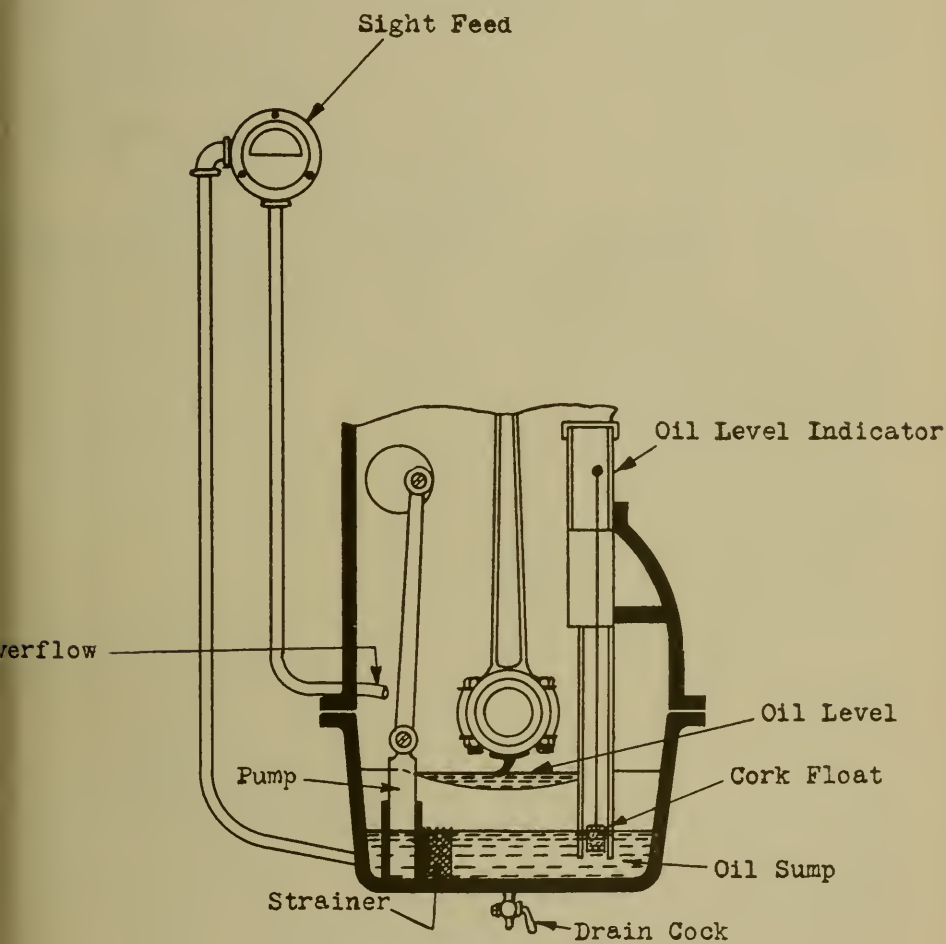
When a lubricant, as oil or grease, is placed between two metals, it fills all the microscopic depressions, and makes a smooth film between them. Theoretically, therefore, two moving metal parts between which there is a film of oil, will not touch each other but will be prevented from actual contact and the resultant wear by the film of oil or other lubricant. The more rapid the movement of the parts, or the greater the pressure, the more lubricant is required. A bearing in which a shaft is turning at a constant speed demands a constant supply of oil, which must be fed to it regularly as required. All moving parts of an automobile must be lubricated. The faster moving parts are subjected to greater heat than the others, and the form of lubrication must vary to suit the needs of those different conditions. In the gasoline engine, the parts move at very high speed. The heat thus generated added to the heat of the explosions, conducted through the metal, results in a high temperature. These parts, therefore, must be supplied with a perpetual bath of oil while in operation.

Various systems are used for supplying the parts of the engine with a plentiful supply of oil. These systems may be classified under main headings, namely, Splash systems and Force Feed systems. The "Simple Splash" system is obsolete, but will be described as it is the foundation of the circulating splash system.

Simple Splash System.—In this system, the crankcase is filled with oil to such a depth that the bottom end of the connecting rod dips into the oil as it revolves, and splashes the oil to all parts of the crankcase bearings, and the fine spray or "oil-fog" caused by the lower part of the pistons when they are at the bottom of their stroke, is carried up into the cylinders. Thus the entire motor is lubricated by the splash created by the impact of the connecting rod bearings against the oil.

As the oil in the crankcase is used up, more must be added to maintain the proper level. This may be accomplished by pumping it to the crankcase from

PLATE NO. 1. LECTURE NO. 5.



Circulating splash oiling system.

a supply tank by a hand pump or by pouring oil into the breather pipe (opening in crankcase).

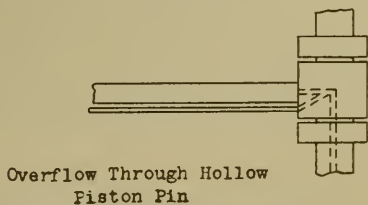
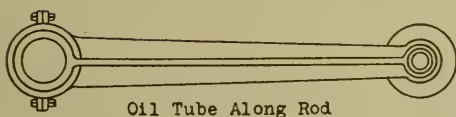
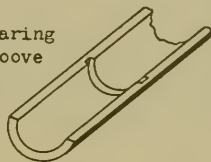
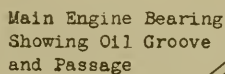
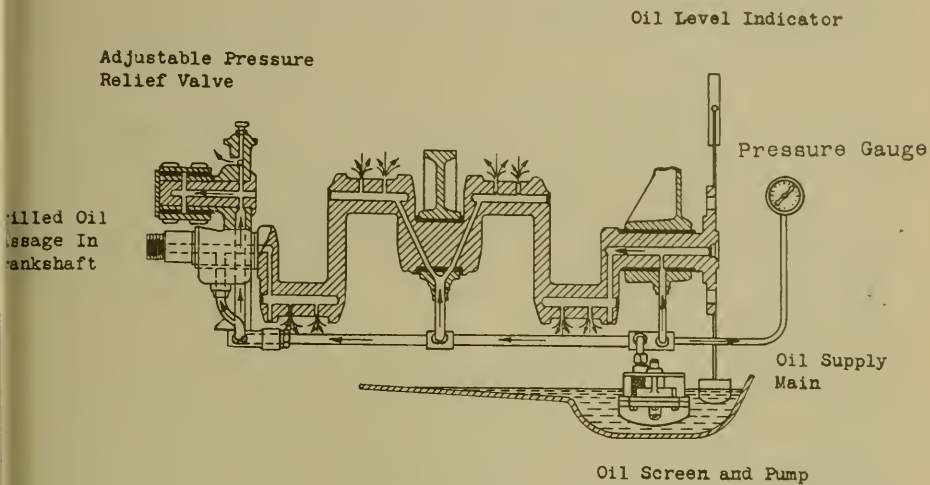
While the simple splash system is quite satisfactory when the engine is level, the great drawback of this system is, that if the motor is inclined, as when the car is going up or down hill, the oil runs to one end of the crankcase or the other, so that there is no oil at the opposite end. Consequently the cylinder and bearings at one end get an over supply of oil, and those at the other, none, causing them to run dry and burn or seize, if the engine is in an inclined position for too long a time. This condition can be somewhat overcome by dividing the crankcase vertically by "baffle-plates," although this scheme only partly remedies the difficulty. On account of this danger, that all of the bearings will not get a sufficient supply of oil all the time, the simple splash system is now never used on automobiles.

Circulating Splash (Pump Over).—This is a system which works on the same principle as the simple splash, but has improvements which overcome the disadvantages of the latter, and provide a constant supply of oil for all the connecting rod "scoops." "Oil-scoops" are usually attached to the connecting rod bearing to assist in splashing the oil. These consist of a small piece of pipe about an inch long, which is threaded and screwed into the lower bearing cup. One side of the pipe is cut away, so that it has the appearance of a sugar-scoop. The lower crankcase in this system is divided by an oil "pan," which has depressions, or troughs so arranged that when the pan is placed in the crankcase, these troughs come directly under the connecting rod bearings. A supply of oil is held in the crankcase space beneath this pan. This lower space is called the "Sump" of the motor. An oil pump is used to draw the oil from the sump through pipes to the main crankshaft bearings. As it overflows from these bearings, it is thrown against the sides of the crankcase by the centrifugal force of the revolving crankshaft.

Oil "gutters" on the sides of the crankcase, lead the oil down to all the troughs, under the connecting rods, which splash it to all parts of the motor as in the simple splash system. The main improvement of this system over the simple splash is that the troughs under the connecting rods will always have oil flowing into them at all times, no matter at what angle the motor may be, and a constant level of oil for each connecting rod "scoop" is assured. Holes in the "pan" allow the oil to return to the sump.

The pumps are usually either of the "gear type" or the "plunger type." The gear pump consists of two spur gears which are "in mesh" with each other, and are turned by a shaft and spiral or bevel gears from the camshaft. As two spur gears turn in a close fitting housing the oil is carried by their teeth. The plunger pump is usually operated by an eccentric on the camshaft, which makes the plunger go up and down. This pump may be regulated by adjusting the length of the plunger, so that it will have a longer or a shorter stroke, and will consequently pump more or less, as desired.

A cork float, together with a vertical wire which acts as a level-gauge, is the usual indicator of the amount of oil in the sump or reservoir. The reservoir should always be kept more than two-thirds full. A sight feed is also placed on the dash in front of the driver, so he can actually see the oil running. If the oil stops running through the sight feed, the engine must be stopped at once, and the trouble located. A lack of oil in the crankcase, leaky connection in the oil pipe from the pump to the sight feed, dirt, or faulty pump may be the cause. A fine copper mesh screen is always located where the oil enters the pump, and this screen sometimes becomes clogged with dirt which interferes with the circulation. The screen usually comes out with the drain plug and should always be cleaned when the oil is changed.



Full Force Feed Oiling System.

Plain Force Feed System.—In this system, the oil is forced by a pump from the oil sump through tubes to the main crankshaft bearings and then through ducts drilled through the crankshaft to the connecting rod bearings. The oil flies from these bearings as they whirl around, and the oil is sprayed to all parts of the motor. This system very seldom uses the splash system in connection with the force feed, although it is sometimes done. In this case the oil would drip down and run into troughs, where it would be splashed by the connecting rod bearings.

Full Force Feed.—This system uses a plunger-type pump which forces the oil under high pressure to the main bearings. From the main bearings, the oil is forced through the hollow crankshaft to the connecting rod bearings. A hole is drilled in the crankpin, and another in the bearing cap, as the crank revolves, the bearing is not only lubricated itself, but as the two holes come together each revolution, the oil is forced to the piston pin and bearings by a copper tube attached to the connecting rod. The excess oil at the connecting rod bearing is thrown against the side of the crankcase by the centrifugal force of the revolving shaft and splashes in a fine spray all over the interior of the engine.

In the Pierce-Arrow and Packard Trucks, the oil pressure is adjusted by means of a pressure-relief valve, instead of by adjusting the length of the stroke of the oil pump. The pressure relief valve consists simply of a valve located near the pump and strainer on the side of the crankcase, and the adjustment is by means of a nut increasing or decreasing the spring tension; the greater the tension, the greater the pressure. Instead of a sight-feed on the dash as in the circulating system, this system has a pressure gauge. This gauge should show a pressure from 5 to 30 lbs., according to the type of pump and speed of motor. Should the gauge show no pressure, the engine should be stopped at once, and the trouble remedied. Too much pressure may indicate a clogged pipe. The pressure may be regulated by adjusting the plunger-pump, as described before, or by adjusting the "spring and ball" if this type is used.

Where the full force feed oiling system is used, the oil in the crankcase should be drained out, the crankcase washed with kerosene, and filled with fresh oil every 500 miles. In other systems, this should be done every 1,000 miles.

The process of changing the oil is accomplished as follows: (1) Unscrew drain plug at bottom of oil sump, draining oil into pail or other receptacle. (2) Replace drain plug. (3) Pour about a gallon of kerosene into crankcase through the "breather" pipe. (4) Crank the engine for about a minute either by hand or starter. Do not start the motor under its own power. (5) Remove drain plug and allow kerosene to drain out completely. (6) Fill crankcase with fresh oil to the proper level. (7) Crank engine over several times before starting, in order to get the fresh oil into bearings, and started into its proper channels.

Only the best grades of oil should be used in a gasoline engine. The oil should have good cohesion (viscosity) and a high flash-point and fire test in order to give proper lubrication in a motor, for the heat in the cylinders (about 400° F.) will "break-down" or burn up a cheap unstable oil. An engine can be actually worn out in about one-third of its natural life by using poor oil. Follow the recommendations of the manufacturer in the matter of oil whenever possible.

The use of a poor grade of oil, but especially lack of sufficient oil will cause all the bearings and pistons to swell, and if allowed to run, the motor will be

ruined by burnt out bearings and "scored" cylinders. Lack of sufficient oil can be usually detected by a smell of burnt oil coming from the engine, and metallic "knocks."

Unless an engine is new, or has very tight fitting pistons and rings, too much oil in the crankcase will result in an excess of oil working up into the cylinders, past the pistons and into the combustion chamber, where it will be burned, and leave a carbon deposit. No oil is able to withstand the heat of the combustion chamber, but the poorer the oil, the greater the carbon deposit. If an engine gives trouble by constantly carbonizing and smoking, the trouble may not be too much oil, but leaky pistons and rings. If the oil is kept at the proper level in the crankcase, and the spark plugs are being constantly fouled and oil soaked, and carbon is formed rapidly and blue oil smoke comes out of the muffler, the trouble may be attributed to leaky piston rings, and perhaps pistons as well. New rings, or rings and pistons should be installed, as the case requires. After an engine has been run many thousand miles, especially if poor oil has been used, the cylinders will be worn oval by the side thrust of the pistons. In this case, the cylinders must be rebored, and oversized pistons fitted, or a new cylinder block and pistons installed. Badly scored cylinders will cause a bad leakage of oil into the combustion chamber. The cure for this trouble is the same as for the oval cylinders, although the use of heavy oil and a teaspoonful of graphite in the crankcase about every thousand miles will help somewhat.

If it is not practicable to rebore the cylinders or fit new pistons, excessive "smoking" caused by the motor "pumping oil" up into the combustion chamber may be eliminated to a considerable degree by "champfering" (beveling) the lower of the three compression rings at the top of the piston so that the oil will be collected in the little grooves formed by this process. Very small holes are then drilled through the piston at the bottom of this piston ring groove at a 45° angle, so that the oil will run into the piston and back to the crankcase. Some manufacturers cut an extra groove in their pistons just below the upper ring grooves and drill holes in the extra oil-grooves for this purpose.

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EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course

THEORETICAL AUTO ENGINEERING

LECTURE VI

LUBRICATION

The purpose of lubrication is to reduce friction. Friction is a force which retards the movement of one surface upon another and if continued produces excessive wear and great heat. A surface which appears smooth and highly polished to the unaided eye will, when examined under a strong magnifying glass, appear uneven and scratched. Surfaces which rub together should be as smooth as possible. Oil prevents this excessive wear by forming a thin film on each of the two surfaces like a sheet of ice on a cement sidewalk. If one rubs his hands together for only a short time, the skin of the palms soon becomes heated, but if a few drops of oil or grease are placed between the hands, a great difference is noticed and it will require a longer time to heat the skin than before. Therefore, lubrication is necessary to prevent heat, and nothing causes more trouble and more expense than improper lubrication. To keep a car running smoothly and continually, there is nothing more necessary than systematic lubrication.

Friction means wear and heat. Therefore, *proper lubrication is absolutely essential.*

Properties of Oil.

At the present time most of the oils used for engine lubrication are mineral oils made by distilling crude oil. A good cylinder oil should have three main requirements. First, it should have a high "fire test," that is, it should be able to retain its lubricating qualities at a high temperature (often as high as 400 to 500 degrees Fahrenheit). Second, it should not leave any acid or residue. This would cause undue wear and if the engine were allowed to stand for a time without use would cause rusting of the highly polished bearing surfaces, thereby increasing friction. Third, it should be able to withstand reasonably cold weather without becoming solid. In a cold climate, it is desirable during winter to use a cylinder oil with a sufficiently low "cold test" that will not become so stiff as to make cranking too difficult or to prevent its flow to the bearing surfaces. In cold weather the engine should be run slowly for a few minutes before its speed is increased, especially if it has to pull a heavy load. This is done in order to loosen up the stiff and frozen oil, thereby insuring proper lubrication.

Clutch Lubrication and Care.

Disc or plate clutches are sometimes designed to run dry, in which case rubbing surfaces are generally faced with asbestos. Special grease or oil cups are then provided to permit oiling of the bearing surfaces, such as the throw-out collar and the bushings where the shaft turns when the clutch is brought to rest in released position.

Other disc or plate clutches are sometimes designed to run in a bath of oil. Such a clutch may have an asbestos facing or may have metal plates working against metal plates. When a clutch runs in oil the film of oil must be squeezed out between the discs before the clutch takes hold. When a clutch is designed to run in oil the housing should be drained, flushed out with kerosene and refilled with light oil from time to time as directed by the manufacturers in their instruction books.

The leather of a leather faced cone clutch should be kept soft and pliable by frequent applications of neat's-foot oil. If any form of housing is provided so that a small quantity of oil is retained to keep the leather at all times soft and pliable, the residue should be washed out and the oil renewed. The quantity added should not be more than that recommended by the manufacturer. The hub of the clutch is very often provided with a plug so that it can be kept filled with soft grease or heavy mineral oil.

Care and Lubrication of Transmission.

The most satisfactory lubricant for the sliding gear transmission is a heavy molasses-like mineral oil. This has the property of following the gear teeth and maintaining satisfactory lubrication, and the gear teeth do not cut tracks in it as they would in hard grease. Metal particles which are worn from the gear teeth when the gears clash sink to the bottom and do no harm if the transmission lubricant is semi-fluid, but if hard grease were used, these particles would be carried between the gear teeth or into the ball or roller bearings, causing wear, noise and possibly even breakage.

When the case is filled, the manufacturer's instructions concerning depth and quantity should be followed. In general it is necessary that the oil come up at least to the bottom of the lower shaft so that all the gears will be properly lubricated. In addition, if the case is filled to the top it is almost certain that the oil will work out past the bearings. Packing rings are generally provided on the shafts to hold the grease and exclude sand and dust.

Every two thousand to five thousand miles, as recommended by the manufacturer, the lubricant should be drained from the gear case and the case flushed out with kerosene and refilled.

Lubrication.

Lubrication is probably the most important detail in connection with the care of the rear axle.

To insure effective lubricating of the driving gears of the differential mechanism, the rear axle housing should be kept filled to such a depth that the driving gear will dip an inch or an inch and one-half in heavy mineral oil about the consistency of molasses (similar to 600-W). This will follow the gears as compared with hard grease in which they might cut tracks. Particles of metal worn or chipped from the corners of the gear teeth will sink to the bottom of this heavy oil; whereas with grease the particles might be carried in suspension into the gear teeth and bearings where they would cause noise, wear or even breakage.

Stiff grease should never be used in the rear axle housing if it is tight enough to hold a heavy molasses-like oil or a light bodied grease.

The rear axle housing should never be filled with a lubricant to a greater depth than that recommended by the manufacturer in his instruction book (sometimes indicated by a high level drain plug).

The use of a small amount of finely divided flake graphite mixed with a heavy oil or light grease in a bevel gear rear axle is often recommended by the manufacturer.

The grease cups and oil cups on various points of the rear axle assembly such as on the brake shafts, springs, saddles, torsion and radius rods, etc., should be filled faithfully.

The differential case should be drained, flushed with kerosene, and refilled every 2,000 to 5,000 miles as recommended by the manufacturer.

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LECTURE VII
REPAIRS MADE BY COMPANY

We shall take up in this lecture the repairs of the company.

Company repairs consist of keeping nuts and bolts tight, cleaning spark plugs, trimming solid tires, making minor adjustments to electrical, oiling and cooling systems, cleaning crank case, changing oil and greasing transmission and differential at proper time. In addition, company mechanics and drivers must report at once parts that show undue wear, breakages and suspected trouble without delay. Where the repairs are beyond the facilities of the company mechanic and the light repair truck, the Company Commander should arrange at once that this truck be sent back to the service park with all speed. No extensive repairs are undertaken in the company, such as tearing down the motor or any of the other assemblies such as transmission, rear axle, etc. In the first place, the company mechanic has not the equipment to do this work and in the second place, it would require too much of his time, and mean that he would have to neglect minor adjustments and upkeep work on the rest of the trucks, all of which is important.

The company mechanic is also responsible for the tool equipment on the light repair truck, which is part of the company equipment. He signs for these tools from the Company Commander; he signs for all spare parts and motor supplies issued to the company, and he issues all these things out to the assistant mechanics or drivers on memorandum receipts so that he has his records clear and in order at all times. The company mechanic is charged with the responsibility of keeping up the unit equipment list of the repair truck and the cargo trucks, and this is done by requisition on the service park for tools that have been broken or worn out and for supplies that have been issued from the light repair truck. There is a unit equipment list for every type of vehicle that is operated in France. This unit equipment list includes all the necessary tools and a few small parts and supplies which should be carried with the vehicle at all times. Whenever tools are lost, broken or worn out the driver must immediately notify his Commanding Officer and arrange for the replacement of these articles without delay. As far as possible, such articles are replaced from the stock kept in the light repair truck. Everything about the truck that can be taken off or removed in any way is entered on this unit equipment list. The drivers are pecuniarily responsible for everything appearing on the list.

The proper handling of a vehicle on the road will save a large amount of repair work in the company, and will save spare parts, the value of which in France cannot be overestimated. I want every one of you to consider this fact when driving. Conserve your brake lining by intelligent use of the brakes. If you have a long hill to go down, throw your car into first or second gear, and only use your brake to bring the car to a dead stop on the hill. When it is necessary to make an emergency stop with the brakes, do not hold

the brake on until it gets heated up and burns out the lining. When you get into a hole or a bad place and are stuck, be careful not to rip the facing off your clutch or strip your rear axle pinion. Never allow your truck to be overloaded. If approaching a bump or hill, slow down in order not to run the risk of breaking a spring. Never attempt to back your truck unless you have some one walking back of it or standing in front of the truck to show you which way to go, and so avoid smash-ups and accidents.

We will take up next the responsibility of the drivers. There seems to have been a great deal of discussion and some misunderstanding as to how far the driver should be educated in the mechanical construction of his vehicle. Some have said that he should not have any instruction except in driving and that he should be entirely ignorant of the theory and practice of automobile engineering. That has not been our experience, and on the contrary we have tried to give the driver every bit of instruction along that line that the time afforded while he was going through school. If he were there for any length of time he kept delving further into the construction and adjustment of the vehicle which he was operating, both the theoretical and the practical, so that when he was through with his training he knew when shifting into first gear just what was happening in the transmission, and he also knew the difference between a surge in the motor caused by the carburetor being badly adjusted, and a surge due to two cylinders not firing properly. A driver is very often called upon to make minor adjustments himself under the supervision, if possible, of a company mechanic, but the company mechanic cannot be everywhere at once and the driver has to be able to do these things. The driver is responsible for the proper cleaning of his vehicle. Perhaps this does not sound important to you, but it is *highly important*. We have suffered a great deal of criticism in France in the American Army by the appearance of our trucks and cars. They were not washed, mud would remain on them for weeks; they were not properly lubricated. Drivers were sloppy in appearance and driving and very often they would pull up at some divisional headquarters alongside a British headquarters staff car or a French headquarters staff car. The comparison was terrible to look upon. The British or French cars would be as bright as a new penny, although in service perhaps for three or four years. Every bit of brass and metal was shined up, the frame, the drive shaft and rear axle housing, ordinarily neglected by you and me, were thoroughly cleaned up. You could put your hand on any part of the car. That is why those vehicles are running after four years of service. The cleaning of the vehicles should be done every day. There is one part of the cleaning that can be done every day and must be insisted upon by every Company Commander, non-commissioned officer and mechanic, and that is that the dirt and dust be cleaned from the spring shackles and all the moving parts of the vehicle. That is absolutely essential, because, if I could go into the spare parts end of it with you and the troubles we have had and the troubles we will always have in keeping spare parts in France it would very nearly bring tears to your eyes. We have not had anywhere near a sufficient stock of spare parts for any of the vehicles in France up to the first of May this year. The lack of spare parts is a very serious proposition in France. The proper cleaning of the car will cut down the demand for spare parts tremendously.

The next thing is the lubrication of the car. There are certain things which must be done every day, certain things which must be done at stated intervals such as every 250, 500, 1,000 and 2,000 miles. You must know the M.T.C. manual backwards and study up on those things which are to be done at the various periods.

In addition to lubrication, there are other things which must be done at the stated intervals before mentioned. I will enumerate them to you and you will find all of these rules in the manual beginning on page 69.

(a) Care must be given to appearance, as well as to mechanical perfection. See that the body and wheels are cleaned of dirt, and inside of body cleaned out.

(b) Be on the lookout at all times for all leaks, and for unusual noises; find the cause immediately and remedy it.

(c) In screwing up grease cups always make sure that the grease has actually been forced into the bearing.

(d) Never cut out the muffler.

(e) Never, under any circumstances, fill the gasoline tank or work on the carburetor in the presence of a naked flame or an oil lantern. If this work must be done in the dark, use an electric torch.

After each run: (To be done as soon as truck returns from run.)

(a) Fill up gasoline tanks (including reserve supply), oil lanterns, headlights and generators.

(b) Drain carburetors. (Much water and other impurities are often found in gasoline.) In freezing weather drain radiators.

(c) Remove mud and dirt from places in immediate proximity to joints and moving parts, such as reach rod joints, spring shackles, distance rod hangers or joints, torsion rod joints, and springs.

(d) After removing dirt turn down grease cups at all places one turn.

(e) Examine and tighten all loose nuts, screws, etc., including those of the wood-work.

(f) Wash entire truck, if possible.

At end of 250 miles:

(a) Fill up all grease cups and see that oil holes are not stopped up.

(b) Clean motor and pan under motor; clean spark plugs; oil magneto (only drop or two); clean carburetor.

(c) Examine clutch; permit no oil on a leather faced clutch.

(d) Transmission Case; fill with lubricant if necessary.

(e) Brakes; examine and regulate tension.

(f) Chains; examine tension.

(g) Clean oil strainers.

(h) Examine all wiring as to insulation and connections.

(i) Go over all nuts and bolts.

At end of 1,000 miles:

(a) Drain crank case, wash with kerosene, and fill with fresh oil. (Save old oil to return to service park.)

(b) Jack up body and clean and grease spring leaves.

(c) Remove chains, bathe in kerosene, clean with brush, grease and put back.

(d) Fill differential with oil.

(e) Examine all grease boots and clean and refill, if necessary.

I want to caution all of you to be constantly looking for loose nuts and connections and be constantly tightening these things. Our spare parts situation in France will always be a serious one. We will never have as many

parts as we need and you will seldom have the supplies and parts when you need them. For this reason, whenever your truck stops to load or unload, or whenever you arrive in the park and have a few minutes, go over your truck very carefully from the front bumper through to the tailgate and see that everything is tight and that no defects or mechanical troubles are liable to hold you up on the road. The Motor Transport Corps in France is charged with moving the freight of the A.E.F. We cannot move freight if your truck is out of commission. Troubles corrected before they become serious prevent excessive demands for spare parts, decrease the work of the company mechanic, of the service park, of the overhaul park and of the reconstruction park and greatly simplify the maintenance problem. A burnt out or frozen bearing is inexcusable and in France is cause for court-martial proceedings in every case. You will not be able to give any reason whatsoever for trouble of that nature. There is no excuse and none will be accepted. I have been an Inspector of Motor Transportation for several months back in France. I know whereof I speak and I know that the causes of breakdowns in the Motor Transport Corps were in 7 cases out of 10 due to the inefficiency of the drivers of the vehicles. These drivers were not properly trained. They had no conception of discipline before going to France. They were slovenly in their personal appearance. Their trucks were dirty, not properly lubricated, parts were lost off the trucks, thereby tying up that piece of equipment for days and sometimes weeks, bearings were burnt out, brakes burnt out, clutch facings ripped off unnecessarily, radiators smashed, and the vehicles generally not able to handle the freight. The things I have mentioned here, if allowed to continue, are nothing short of criminal offenses which at this time deserve the strictest disciplinary action. Both the driver and the company mechanic are responsible for the log-book which accompanies every vehicle in France. This book is issued to the vehicle at the reception park at the port of debarkation. It stays with the vehicle as long as the vehicle is in service. This log-book is about 4 inches wide and 6 inches long. In it are kept records of transfers of the vehicle and of all repairs made by any repair parks. The first page of the book is given over to the specifications of the truck, the engine number, the chassis number, U. S. number, the type and model of the truck and the detailed list of the equipment which was placed on the truck at the reception park. Beginning with the next page there are spaces for the driver to sign for the vehicle and for its equipment and in each case of transfer his signature is witnessed by the signature of the Commanding Officer. The last 3 or 4 pages of the book are given over to records of repairs made. This record shows the number or name of the repair park making the repairs, what the repairs consisted of, what spare parts and supplies were required to make the repairs, and the signature of the inspector or officer entering this data. The information regarding repairs which is entered in this book is invaluable to us at headquarters as it shows the performance of a truck and also shows the class of repairs that are having to be made on that particular make of vehicles and enables steps to be taken for the correction of defects and changes in construction. This log book is to the car what the service record is to the soldier, and the driver is held rigidly responsible that it is not lost and that it is kept clean and all data entered up to date.

The driver's further responsibility is the proper loading and lashing of his cargo. It is very important that his truck is not overloaded and that his cargo is so placed that he will get traction. This cargo in certain kinds of weather should be mainly over the rear wheels, and the driver should watch the loading and unloading carefully. He does not do it himself, but he is charged with the responsibility that the load is put on properly and that he gets a full

load. Every vehicle in France must carry a full load every time it turns a wheel. We must insist on full loads as far as possible, because of the scarcity of equipment.

I shall take up in this lecture first the class of repairs and adjustments that you as a driver must be conversant with, and secondly the details of your responsibility and accountability for equipment placed in your charge.

There are three things about a motor car or a motor vehicle which require constant looking after in France. They are all of equal importance, and it is hard to say which one should have more emphasis than the other. You should know how to drain your carburetor and clean out the dirt, which is sure to collect. Gasoline as it arrives in France is of very poor quality. It contains impurities such as water and dirt and tests very low for specific gravity. This water and dirt must be kept out of the float chamber away from the needle valve. If there is no pet cock drain plug on the bottom of the carburetor, it will be found necessary to disconnect the feed pipe at the carburetor and allow both the pipe and the carburetor to drain. Water also accumulates in the bottom of the tank. However, by allowing the gasoline to run out of the feed pipe, when disconnected at the carburetor, into a pail or can, both the tank and the pipe will be pretty thoroughly cleaned out. This work must be done with great care in order not to lose any of the gasoline during the operation. By careful handling the gasoline can be poured back into the tank leaving the water in your can. There is usually a strainer in the feed pipe and this should be kept clean at all times.

You should know the adjustment of your carburetor. When you are in park or on the road with your company, the adjustment of the carburetor will always be made by the company mechanic or his assistants. It might happen, however, that you are on the road alone without the mechanics and emergency adjustments are found necessary. You must be able to distinguish between a surge in the motor caused by improper adjustment of the carburetor and a surge in the motor caused by one or more cylinders not firing. You must know that when a popping noise is in your carburetor, you have either got water or dirt under the needle valve or too thin a mixture. The first thing to do is to drain the bottom of the carburetor and the feed pipe to see if water or dirt is in there. If that does not correct the trouble, you should know how to adjust your needle valve to give a richer mixture. It is impossible to show you or to tell you so that you would understand without models to demonstrate this with. This adjustment and those which I will call your attention to later will be given to you in your laboratory and practical work. Pay particular attention to the points which I will bring out in this lecture, for they are points which we have learned to be important in France after one year's experience.

The next point is the adjustment and equalization of your brakes. The country over which you will be operating near the front line is very hilly and there are constant demands on the brakes. The result is that the brakes require almost daily attention. Before attempting to go down a steep or a long hill, slow down and shift to first or second speed before getting over the crest of the hill. Your engine then acts as a brake and, except in cases where it is necessary to make an emergency stop, your foot and emergency brakes will have to be used but little. If, for any reason, you do not have time to change gears before starting down a hill, use your foot brake for a few seconds and then shift over and use the hand brake. Alternate in this way all the way down the hill. Never use one brake continually for any length of time, as it not only wears it out quickly but it is almost sure to get hot and bind. The

result is that your truck comes to a dead stop and ties up all of the trucks back of you. This is a point you must remember. "Above all things keep your truck in motion when operating in a convoy." If it is impossible to keep it running, pull your truck as far as possible to the right hand side of the road, even into the ditch if necessary, so that other vehicles can pass you. However, if the brakes are carelessly used and become seized, you will find it impossible to run your car or even to push it out of the way until the brake drums and the lining have cooled off. For that reason you must be doubly careful not to have this occur. It is not your own truck alone that you are putting out of service temporarily, but you are tying up perhaps five miles of trucks back of you. Test your brakes two or three times a week at least to see that they are equalized. This is done by jacking up both rear wheels, setting your hand brake so that it is just possible to turn the rear wheels by hand. See that the brakes take hold approximately in the same way on both wheels. Then have some one sit in the driver's seat and hold the foot brake down part way and test both rear wheels to see if the foot brake is equalized. If you are not careful about this point your troubles with skidding will greatly increase, and you will lose a great deal of the efficiency of your brakes. Watch your brake lining carefully and anticipate the necessity for renewal of this lining before it actually wears out. Due to the almost constant operation in convoy it is absolutely essential that your brakes be in excellent shape. Any accident which you may have in operating your vehicle in France is investigated very thoroughly by a commissioned officer. You as a driver must not only prove that the accident was not your fault, but you must also prove that it was a physical impossibility on your part to avoid it. So you see the importance of having your brakes well adjusted and being able to control your car at all times so that you will not smash your radiator or have the rear end of your truck knocked out.

The next thing is the cleaning of spark plugs and adjustment of plug points and the tracing of ignition troubles. Your spark plugs should be cleaned very often, at least twice or three times a week. Be very careful in taking them out of the ports that you do not break the porcelains. If you are careless in the use of your monkey wrench or spanner or if you drop the spark plug after you have taken it out you are liable to break this porcelain and you will have to have a new plug before you can operate. If you do break a porcelain it is up to you to explain exactly how it happened and prove that it was not due to carelessness on your part. The actual cleaning of a spark plug and the adjustment of the points will be shown to you during your course. I will only dwell on the importance of keeping them clean and the importance of your knowing how this is done. You will also be shown during this course how to trace ignition troubles. Ignition troubles should always be turned over by you to the company mechanic, with the exception of the cleaning of spark plugs. The adjustment of the points must be done by the company mechanic unless he is not around and it is impossible to arrange for him to do it.

I have prepared a list showing the adjustments and repairs with which you as drivers should be acquainted, and which you should study during your course. A copy of this is attached to this lecture and copies will be distributed to you for your guidance. The more you know about your vehicle, and the better you know the adjustments and repairs which must be done on it, the quicker you will get promotion and reward, and the more value you will be to your company and to the service as a whole. You may think you know all about it, but I can truthfully state that no one ever knew all there was to know about a truck or automobile. Men have made a life study of it and are still learning every day. Whenever I hear a driver bragging about what

he knows and saying that there is not a thing about his truck that he does not understand, and that there are no repairs which he cannot make, I immediately put him down as the least efficient of the outfit. Do not brag about your knowledge but dig in and learn, and show it in the operation of your vehicle and in the way you keep it up. If you will master the three adjustments mentioned above, you will have a minimum of difficulty in keeping your truck in service at all times.

I will outline to you the extent of your responsibility for the motor equipment placed in your charge. Whenever you are assigned to a truck, a memorandum receipt is made out by your Commanding Officer giving the make and type of truck, serial number, motor number and a list of all the equipment on the truck at the times of transfer. This memorandum receipt is known as M. T. S. Form 101. All assignments and all transfers are recorded on this form in France. The Unit Truck Equipment is shown on page 92 of the Manual and you should be sure that every article called for is actually received before you sign the memorandum receipt. This form is in quadruplicate and is made out by the person transferring the equipment and is signed by the person receiving the equipment. This remains a permanent record in the office and is used in checking up periodically for shortages, breakages, and loss on your truck. Any shortages will be taken out of your pay at the end of the month. No excuses are accepted and none should be necessary. You are responsible for a good many thousands of dollars worth of Government property. As I have told you many times before, the truck and its equipment are almost impossible to replace in France. That is why you will be held pecuniarily responsible for it. Whenever you are relieved from your truck and another driver takes charge of it, you must make sure that he signs for this equipment, and that everything is checked off against the original list. If this is not done you may find a few days or weeks later that you will be charged up with certain tools and supplies and made to pay for same, whereas their loss occurred after you had been relieved of your truck. As you are aware, the army need not consult you about taking money out of your pay for loss or damage to Government property. This is something that is beyond your control. When you take over a new truck that has been in use by some other driver, use all care to see that he does not "put anything over on you," as we express it. If he is short of equipment, he will try very hard to get you to sign for things that actually do not exist. You have got to have your eyes wide open and not take his word for anything.

At all formal inspections your equipment is checked over against the list as it appears on M.T.C. Form 101, memorandum receipt. These inspections are held about once every month and perhaps oftener. You will find it much easier and better all around to report loss or damage to equipment *immediately* after it occurs rather than let it slide until an inspection takes place. I know this from my own experience. Losses are bound to occur even though you use the greatest diligence and care. It is much better, therefore, to report such things to the Sergeant Mechanic or Commanding Officer, and get it over with at the time that it happens, rather than take a chance at getting by with it until a week later when a formal inspection is held.

When you take your truck to a service park for repairs, all of your equipment is taken off and checked against your copy of M.T.C. Form 101, which is carried with you at all times. This equipment is done in a bundle and placed in the stock room for safe keeping. When you return a day or two later to take your truck away the bundle of equipment is taken out of the stock room and spread out on the ground and rechecked according to your list. Any shortages appearing in the equipment when you report in the park

with your truck are noted, and when you leave the park with your repaired truck make sure that you get everything you are entitled to according to your list. If tools or supplies have been stolen while your truck was in the park, report this at once to the Commanding Officer of the park and insist that the equipment to be returned conform with receipt of equipment delivered.

Never allow any other man to drive your truck except the assistant driver who is assigned to you. You must make this a hard and fast rule, for if you do not, and you allow another man to operate your vehicle and he suffers an accident or steals any part of your equipment, you are the one that is held responsible for it.

Conservation of everything shipped overseas for our troops is our watchword in France and I want you to get into the spirit of conservation before going over so that it will become natural to you when you arrive.

One very important factor which will contribute enormously to the success of your organization is *teamwork*. I mean by teamwork, hearty cooperation between every member of the organization—a spirit of wanting to help each other, a spirit of pride in your organization, a serious viewpoint on the important work that you are doing. Be very jealous of the reputation of your company. Uphold its honor, protect its good name and at all times reflect credit upon it whether in camp or on the road or on leave. We call this *teamwork*, "*Esprit de Corps*," in France, and you will hear a lot about it when you get "Over There." In order to make this *Esprit de Corps* worth while to you, if such a thing be necessary, a system of rewards for efficiency and good service has been worked out, whereby a driver who always has his vehicle ready to roll, who never has any criticism of the operation of his vehicle or of his personal appearance and conduct, receives time off, in addition to the regular company liberty, on certain stated days of the week. If his record is clean for a period of four weeks, a white star about 3 inches in diameter is stencilled on the side of his car underneath the driver's seat. This white star means that the driver has a record of excellence for at least a period of 4 weeks, and it is known throughout the A.E.F. to have that meaning. You cannot earn that white star nor the time off, which I have mentioned before, if you are ignorant of what is expected of you and you do not know how to keep your truck up, how to keep it clean and properly lubricated, etc. Therefore, it is up to you to learn these things so thoroughly that within the first two months after your arrival in France you will be having a white star on the side of your car.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH
Motor Truck Officers' Course
THEORETICAL AUTO ENGINEERING

LECTURE VIII

MINOR MOTOR TROUBLES AND THEIR ADJUSTMENT

Failure of the Engine to Start.

When an engine fails to start readily, the cause may be found in most cases in a very short time if a regular system of search is followed; instead of the hit or miss method of looking first one place and then another, and tampering with first the carburetor, then the magneto, then the wires, and so on without any definite plan.

If the engine is to run it must take into its cylinders an explosive mixture of fuel and air, it must compress this mixture, the mixture must be ignited by a good spark produced at the right time, and the valves must so operate that the burned products are expelled from the cylinders properly to make room for new incoming mixture.

A very good method to follow in testing or trouble hunting is:

(1) Try the compression with the hand crank, turn the engine at least two revolutions and rock against each compression to determine that there are the proper number of compressions and that all are nearly equal.

(2) Be certain of the fuel. The best way is to prime each cylinder directly with a small amount of gasoline, being careful not to over prime, especially if the engine is hot. Gasoline must be in the cylinder to burn, and to put a small amount there is quicker and often more effective than tampering with the carburetor.

(3) Investigate the spark. Disconnect a spark plug wire and hold the end a short distance from the plug, or disconnect the wire from the secondary terminal, while the engine is turned over and watch for the occurrence and quality of the spark. With all of these conditions right, the engine should start. If it still fails, continue with 4.

(4) Be sure that the mixture is not too rich. If the engine is hot, it is very easy to have it flooded; that is to have such an excess of vaporized fuel in the cylinders that no explosion will take place. Cranking the engine slowly with the priming cups slightly open, or with the throttle wide open and the fuel supply turned off, should remedy this condition. Sometimes flooding washes the oil away from the pistons and rings and it becomes necessary to pour a small quantity of oil into each cylinder through the spark plug hole to seal the pistons and rings against leakage of compression.

(5) Test the timing of the spark. Disconnect a spark plug wire and hold it near the plug or near a clean spot on the engine, or remove a spark plug and lay it on the cylinder with the wire attached. Then see if the spark occurs at the end of the compression strokes of the cylinder under inspection. The compression stroke may be found by holding the thumb over the open priming cup or spark plug hole.

To Test the High Tension Magneto.

If the car is equipped with high-tension magneto, disconnect the conductor which connects the collector brush to the centre of the distributor and turn this so a metal part of it is about one-sixteenth of an inch from the magneto or some other metal part of the magneto or car, or turn the safety-gap cover spring until it is close to the magneto. If the construction does not permit this test, remove the distributor and fix or hold a wire with one end against some metal part of the magneto or the engine and the other end near to but not against the centre of the distributor arm, or use a test wire as seems best. If no spark is produced when the engine is cranked briskly, remove the primary or grounding wire which connects to the switch and spin again. If there is still no spark, examine the circuit breaker points while the engine is turned slowly in order to determine whether they break and make contact properly. A small mirror will make this examination easy. The points may be fouled or burned, they may be oily, or the breaker arm may be frozen fast so that the spring does not bring the points into proper contact after they have been separated by the cam.

They should break approximately .015 of an inch or about as much as the thickness of a calling card. The wrench provided by the manufacturer for adjusting the points generally has a thickness gauge.

To Test a Battery Ignition System.

If the engine is equipped with a modern ignition distributor battery system, disconnect one end of the wire which joins the secondary terminal of the spark coil to the center of the distributor and hold the end close to, but not against the terminal from which it was detached. Crank the engine and watch for the spark. The trouble of cranking can be avoided by varying the method of test. Loosen the clamping or lock springs and lift or turn and lift the distributor head. Fasten one end of test wire to ground and hold the other close to, but not against the secondary terminal of the coil or close to the center terminal of the distributor while the distributor is laid or held in an inverted position. Cause the breaker points to make and break contact with the finger or a screw driver. If no spark is produced, use a test lamp or test wire to determine whether there is current at the primary terminals of the coil and at the terminals of the circuit breaker. The current should pass from the battery through the switch, through the primary of the coil, through the circuit breaker points, and back through the wire or through the frame to the battery.

While the engine is turned, note whether the breaker points connect and break the circuit properly. The points may be fouled or burned, they may be oily, or the spring may not return the breaker arm so that the points make proper contact after they have been separated by the cam. The wrench provided by the manufacturer for adjusting the points generally has a thickness gauge.

Examine the inside of the distributor and the distributor arm and make sure that they are clean and dry. They may be wiped out with a clean cloth or with a cloth moistened with gasoline. If the distributor head is very dirty it can be cleaned with very fine sandpaper or with a little dust on a piece of damp cloth held over the end of the finger.

Testing of a Spark Plug.

In an effort to test a spark plug the driver often unscrews it from the cylinder, reattaches the wire, lays it down on the cylinder casting, taking care

that the terminal does not make contact, and watches for the occurrence of the spark while the engine is turned over. The failure of the spark to occur in the plug if one can be obtained from the end of the detached wire is good evidence that the plug is out of order. The occurrence of the spark in the open air is, however, no indication that one will occur under high pressure when the plug has been screwed back into the cylinder.

Whether the spark plug has been firing properly or not can generally be determined by inspection, as a plug which has been missing is liable to present an oily or sooty appearance, instead of a dry yellowish-white, clear appearance which indicates that the cylinder is firing properly.

Probably one of the most satisfactory methods of testing is to try the unsatisfactory plug in a cylinder which is known to have been operating properly, or to try a spark plug which is known to be good in the troublesome cylinder.

To determine which cylinder is missing fire, the plugs may be short circuited one or more at a time with a screw driver or other suitable instrument, or the wires may be detached from the spark plug, one or more at a time. The priming cups may be opened and the issuing flame watched for, or the sound noted to determine whether there is any change in sound when the plug is short circuited or the wire detached.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH
Motor Truck Officers' Course
THEORETICAL AUTO ENGINEERING
LECTURE IX

MINOR MOTOR ADJUSTMENTS

If two gears, running together, or in other words in mesh, have the same number of teeth, they make the same number of revolutions. If the driven gear has twice as many teeth as the drive gear, it revolves once while the drive gear is revolving twice. This is called a two to one or half-time gear. Since the cam shaft must revolve only once to every two revolutions of the crank shaft, the cam shaft gear has twice as many teeth as the crank shaft gear. The cam shaft revolves in the opposite direction from the crank shaft when driven by gears without an idler, and in the same direction when driven by a chain.

The wide face helical gear is most popular for the timing gears. Special material as fabroil, micarta and other compressed materials are used by many manufacturers for making gears which are silent. Drop-forged gears are also used to a great extent; also steel for the crank shaft gears and cast iron for the cam gear.

The silent chain for driving the generator is quite popular. It is also being used to a certain extent for driving the cam shaft. The object is to obtain quieter running. This type of chain must not be confused with the ordinary roller type as used on chain-driven trucks. The silent chain is more positive in action otherwise the timing would be thrown out of adjustment. The teeth on a sprocket used for a silent chain are very close together and accurate. Any undue slack in the chain can be taken up by sliding the magneto or generator shaft outward. This chain is self-adjusting for pitch, as there is an allowance of twenty-thousandths (.020) clearance before chain bottoms in sprockets.

PURPOSE OF VALVES

There are two valves to each cylinder, to all four-cycle gasoline engines; an inlet valve and an exhaust valve. There are three types in general use; the poppet, sleeve and rotary, the poppet type being used almost exclusively.

The inlet valve admits fresh gas to the cylinder. Fresh gas is going into the cylinder during only one stroke of every four, or in other words, during one stroke of every two revolutions of the crank shaft.

The exhaust valve permits the burned gases to escape. It is opened and held open by a cam on the cam shaft. This is called being mechanically operated. Mechanically operated valves are opened and held open by means of cams which work against a strong spring tension. The exhaust valve is always mechanically operated, except in some of the old types of motorcycle engines in which the inlet valves were automatically operated.

An automatically operated valve is held against its seat by a light spring. During the suction stroke the sucking action of the piston, as it slides downward in the cylinder, draws the valve open. At the end of the suction stroke, when the suction ceases, the spring pushes the valve disc back to its seat and the gas is prevented from escaping past the valve. It must be understood that the valves of a gasoline engine always open inward. Thus the pressure from the power and compression strokes tends to keep the valves firmly on their seats.

Usually inlet and exhaust valves are made the same size. Some manufacturers are making the inlet larger. For instance, the Sterling engine has $1\frac{1}{4}$ -inch intake valves and $1\frac{1}{8}$ -inch exhaust valves. The lift of a valve is the height it is raised from its seat by the cam. Side operated valves may be placed all on one side, or on opposite sides of the cylinders. When on opposite sides two cam shafts are necessary, one on each side. When all valves are on one side, one cam shaft is sufficient.

To grind valves, in an overhead valve engine with detachable head, the head is removed with the valves, and the valves are ground in the head. In an overhead valve engine with cage-type valves the valves are ground in the cage. To grind valves on a side valve engine, the valve caps are removed if the head is integral with the cylinder. If the head is detachable, then the head is removed and the valves are ground in their seats in the cylinder pockets.

Although the valves vary in location and methods of operation, the principle remains the same; the inlet admits fresh gas; the exhaust valve opens at the correct time to allow the burned and used gas to escape.

A valve has three parts; a head and a stem which forms the moving part, and a valve seat, on which the valve fits. When closed, the valve head must fit in its seat so that it is absolutely tight. When open there must be sufficient space to let the gas pass freely.

The valve spring holds the valve tight on its seat and must have tension at all times. If the spring is too strong the valve closes with undue noise. If too loose the valve does not seat properly. The exhaust valve spring usually weakens first on account of the intense heat to which it is subjected.

The valve spring washer is placed at the bottom of the spring and is held in place by a key or retainer under tension of the spring.

Before the student can understand the subject of valve timing he must first learn the four-cycle principle, as it is entirely with this principle we will deal. In addition, the meaning of degrees, and the relation of the valve cam speed to the engine crank-shaft speed, and the importance of valve clearance adjustment, must be thoroughly understood.

If no space were left between the end of the valve stem and the cam, even very slight wear on the valve tappet seat would prevent the valve from closing properly. As the stem expands, it gets longer, so that if no clearance were provided, the stem when pressed would rest against the tappet and the valve would not seat properly. Valve clearance, also called air gap space, is the space between the end of the valve stem and the tappet. The width of this space ranges from the thickness of tissue paper to $1/16$ of an inch. The average gap is somewhere about or slightly less than a postal card thickness. Some manufacturers give about $1/1000$ of an inch less to the inlet than to the exhaust, because the exhaust valve stem lengthens slightly when heated. For instance, the Hudson gives .004 of an inch to the air gap space on the inlet valve and .006 to the exhaust. The adjustment should always be made

when the engine is cold and after the valves are ground, as the grinding will slightly lower the valve.

The inlet cam has a sharp nose. The exhaust cam has a broader nose, because it must hold the valve open longer. The width of the nose, less the gap, regulates the lift. The average lift of either exhaust or intake is approximately $\frac{3}{8}$ to $\frac{9}{32}$ of an inch. It is thus evident that if the air gap is $\frac{3}{8}$ to $\frac{9}{32}$ of an inch too large, the valve will not open at all. If such an air gap ($\frac{3}{8}$ inch) is slightly decreased, the valve will lift very slightly and stay open but a few degrees of the revolution. If the air gap is again slightly decreased the valve opens sooner, raises higher and closes later. This progress can be repeated until there is no air gap left. Now, suppose an engine is designed to have $\frac{1}{16}$ -inch air gap, and there is no air gap at all; the valves will open possibly 30 degrees too soon, raise $\frac{1}{16}$ inch higher than intended and close 50 degrees too late.

As to the wear of the end of the valve stem or tappet, it is apparent that as the wear increases the space or air gap increases and the valves have less lift, open later, close earlier, and become noisier, all of which affects the power of the engine. When valves are noisy, the cause is usually traceable to the wear of the valve stem, although they are all case-hardened at the end as well as the head. The wear, however, comes with time. Too great a lift also causes noise.

Always adjust the valve clearance to the measurement given by the manufacturer. It is important that the valve clearance adjustment be made with the back lash or lost motion in the driving gear entirely taken up in the direction of rotation.

If one of the cams raises an inlet valve just as the piston is starting down on the suction stroke, then a charge of gas is drawn into the cylinder as long as the piston is on the suction stroke and the valve is open. Therefore, the valve should open in time to give the piston a chance to draw in a cylinder full of gas. If the valve opens after the piston starts its suction stroke, then it does not get a full cylinder of gas, and thereby gives less power. Therefore, it is important that the inlet valve be made to open at the right time. The method employed to cause it to open at the right time is by means of the inlet valve timing gear and proper valve clearance. The practice is to allow the piston to descend slightly in the cylinder on the suction stroke before the inlet valve opens, so as to reduce the pressure and to create, if anything, a suction.

In regard to the closing of the inlet valve, it is almost universal practice to let the valve stay open until the piston has not only reached the bottom of dead center, that is, the bottom of the stroke, but has actually traveled slightly up on the compression stroke again. The gas sucked in thus would be forced out again if it were not for the great piston speed. For instance there are 15 complete cycles of operation in one second, or one stroke on the piston to one-sixtieth part of a second. This is such a speed that the piston has reached the bottom of its stroke in an appreciable time before the gas has been able to fill the cylinder. Therefore, after the piston has started to move upward on the compression stroke, there still remains suction in the cylinder, which, if the valve remains open, continues for a short interval to draw in a further charge of gas.

Obviously the exact point at which the inlet valve should close depends upon the speed of the engine; and whatever setting is arranged will not be equally suitable for all speeds attained by the engine. As for instance, when the engine runs dead slow, the late closing is a distinct disadvantage. The

gas is then drawn back on the compression stroke, while at maximum speeds the valve closes before the suction has completed its work. There is, however, an average speed for the engine—in fact for every engine—and the valves are set to the average speed.

EXHAUST VALVES OPENING AND CLOSING

There are two opinions about the opening of an exhaust valve. The valve must open considerably before the piston reaches the end of the explosion stroke; and if this wastes some of the force of the explosion, this waste may be amply compensated for by the freedom afforded the piston in commencing the exhaust stroke.

It is obviously wrong to keep the exhaust valve closed up to the very moment before the piston is about to move upward, because on commencing the exhaust stroke it finds itself confronted for an instant with the force which has just pushed it down. Until the valve is wide open, it is considerably impeded in its journey upward.

For this reason the exhaust valve is usually opened as soon as the piston has moved through about seven-eighths of the power stroke; that is, before the bottom of dead center is reached. The exhaust valves if opened too early cause a waste of power. Stationary gasoline engines, which run at lower speeds than automobile engines, do not hold their valves open so long, the chief difference being in the interval of exhaust opening and inlet closing.

There is little to be said as to when the exhaust valve should close. It may close before the end of the stroke (exhaust stroke). As a rule, on account of what has been explained about the gas which remains in the head of the cylinder being slightly under pressure at the end of the stroke, the valve is quite often allowed to remain open until the piston has moved slightly down on the suction stroke. This gives full opportunity for as much exhaust gas to escape as possible.

In order to understand just how important it really is to expel all of the burned or exhaust gases, it must be explained that one of the chief components is carbon dioxide, which is the most powerful anti-combustion agent known to science. Its presence, therefore, even in small quantities, retards considerably the speed of the explosion development.

The piston now having come to rest at the top of the stroke, there is still the problem of dealing with the burned gases which remain; and for the throwing off of these we must take advantage of the exhaust momentum.

The manner in which this principle operates will be apparent if the contents of the exhaust pipe are pictured as a mass of gas moving outward at piston speed. When the influence which started this movement has stopped, namely, at the top center, the gaseous mass moves almost like the piston of an air extractor pump; and if the valve timing permits, it tends to draw out with it from the cylinder a large proportion of the remaining gases.

If the extractor action of the exhaust gases is to be taken advantage of, the valve must be made to close a little later than the top center, or, as it is technically explained, must have a certain degree of lag. It is evident that if we close it at the exact top of the stroke, the contents of the combustion chamber are imprisoned and contaminate the incoming charge.

The amount of this lag depends on the shape of the combustion chamber, the weight of the valves, the strength of the springs and the design of the exhaust system.

VALVE TIMING AND FIRING ORDER

The difference in size of the bore and stroke of the cylinder, particularly in the stroke, the type of ignition, the shape of the manifold and the speed of the engine, governs the valve timing. Early setting of valves on an engine causes irregular firing at lower speeds, unless a very heavy flywheel is used. It also increases the gasoline consumption in short stroke engines.

For high speed work, the inlet may be opened and closed late. For low speed work, closing the inlet and exhaust on the center gives the best control and eliminates blowing back. The moment of opening and closing the valves with reference to the engine speed, of course, has an important bearing on its performance. If the valves open too early, back firing results, while if they open too late, a sluggish engine and overheating result.

In actual practice the inlet valve seldom opens on the exact top of the stroke but usually after the top of the stroke, varying from 5 to 15 degrees. The inlet seldom closes when the piston reaches the bottom, but from 5 to 38 degrees after bottom. The exhaust valve seldom closes on top of the stroke, but usually 5 to 10 degrees after the top. The position of the crank shaft determines the position of the piston. The position of the piston determines the point where the valve is set to open or close. Therefore, the cam shaft must be set so that the cam raises the valve when piston is at a certain point. This is accomplished by meshing the cam gear with the crank shaft gear when the piston is in the correct position. Marks are usually placed by the manufacturer on the cam gears which indicate just where to mesh the gears. The flywheel is also sometimes used for timing.

SETTING OF VALVES, MULTIPLE CYLINDER ENGINE

There must be at least one inlet and exhaust valve for each cylinder. Therefore there must be four cams for the four inlet valves and four cams for the four exhaust valves.

If the cylinders are "T" head, there are two cam shafts. If they are "L" or over-head there is only one cam shaft.

It is well to note that in four, six, eight or twelve cylinder motors, each piston passes through the four strokes during two revolutions of the crank shaft.

The usual plan is to place the piston of cylinder No. 1 at the top of its stroke and to work from that point in timing valves. The cams do not need to be set on the shaft, but when the cam gear in front of the engine is meshed with the driving gear, the position of the nose of the cams can be adjusted.

The usual plan to time the valves or set them in correct time with the cam shaft is to mesh the cam gears so that the points marked on them will correspond with the marks on the crank shaft gear, at the time No. 1 piston is on top of its stroke. Usually marks also appear on the circumference of the flywheel that indicate the position in which the crank shaft is to be placed for the correct setting of the valves. The mark of the flywheel is placed in line with a center mark on the cylinder or elsewhere. If there are no marks on the gears or the flywheel, then it is necessary first to determine where to set the valves.

There are four strokes to two revolutions of the crank shaft to complete a cycle operation, as explained previously.

A stroke of a piston means to travel from top to bottom or bottom to top, or 180 degrees movement; one-half a revolution of the crank shaft.

There is but one power stroke during the four strokes, or two revolutions of the crank shaft. Also, note that the power stroke is a very short one, owing to the fact that the exhaust valve starts to open considerably before the piston reaches the bottom of its stroke. As the exhaust valve opens 46 degrees before bottom, the travel on the power stroke, that is, the stroke actually under full pressure, is 134 degrees instead of 180 degrees. Therefore, since there is but one power stroke to two revolutions of the crank shaft, in only 134 degrees out of the two revolutions (720 degrees travel of the crank shaft) would there be power. One full revolution of the crank shaft being 360 degrees, there are 720 degrees in two full revolutions; but only 134 degrees are actually under pressure as explained.

In an engine with one cylinder, there is an explosion once during every two revolutions of the crank shaft. In other words, there is one stroke of the piston when the power is being developed, and three when there is no power, the piston then being moved by the momentum of the flywheel. As the piston must be carried through the three dead strokes, it is necessary to use a heavy flywheel, so that when the flywheel is started it will continue to revolve for a sufficient time to move the piston until the next power stroke. There is vibration from a one-cylinder engine on this account, as the weight of the piston sliding first one way and then the other has nothing to balance it. The more cylinders an engine has, the more steadily it will run, because the explosions may be arranged to follow one another so closely that there is no moment when one of the pistons is not on the power stroke.

COOLING SYSTEM

If no provision is made for the cooling of the cylinder of a gasoline engine, the intense heat of the explosions will heat it to a point that will cause the lubricating oil to burn and become useless. At the same time, the cylinders must not be kept too cool, for that prevents the development of full power. The cylinder must be permitted to get as hot as is possible without burning the lubricating oil. Between 170 and 200 degrees Fahrenheit, or just below the boiling point, appears to give the best results.

The cylinder may be cooled either by water or by air, and while the greater number of engines are water cooled, air cooling has been developed to a point where successful results are attained. As trucks are practically all water cooled, we consider only the water cooling system.

The water cooling system consists of water jackets around the cylinder that is to be cooled, and through these jackets water may flow; a radiator for cooling the heated water; and some method of keeping the water in circulation, together with the necessary connections.

The jackets are usually cast in one piece with the cylinder, although in some cases they were formerly sheet copper pressed around the cylinder to form passages through which the water would circulate. When heated, the water passes to the radiator, where the rush of air to which the radiator is exposed absorbs the heat and cools the water.

To maintain the cylinders at a workable temperature, a quantity of water is carried in a supply tank or radiator from which the water is caused to circulate continuously through the jacket of the engine cylinder by a small pump driven direct from one of the cam shafts, or by the thermo-syphon principle. The heated water from the cylinder returns to the tank or radiator and there passes through a series of thin copper tubes, the object being to dissipate, as much as possible, the heat absorbed by this water, by exposing the water to a large cooling surface of metal.

The cooling system is almost always fixed in the forward part of the car, to obtain the full benefit of the draught of air. The same water is used over and over again, so that it is necessary only to replenish the loss caused by evaporation.

It is usual with cooling systems to have a rotary fan to assist in pulling a draught of cold air through the radiator and in accelerating the cooling when the car is running slowly, as in hill climbing, or slow movement in traffic. The fan is driven from the engine shaft by a belt or gear and is at the back of the radiator. The alternative method, which avoids the use of a separate fan, is provided by using the flywheel as a fan.

The two systems of circulation are the thermo-syphon and the force or pump feed system.

HERMO-SYPHON SYSTEM

The Thermo-syphon circulation system has for its principle the fact that when water is heated, it rises. The connections are the same as for the force or pump feed system, except that there is no pump, and the connection from the water jacket outlet to the top of the radiator slants upward. It is more necessary to have clear passages for the thermo-system than for the force system, because the pump, in the force system, forces the water past an obstruction that would stop the flow of water which moves only because of its heat.

HEIGHT OF RADIATORS, THERMO-SYPHON SYSTEM

In this system the radiator must be higher and lower than the extreme top and bottom of the water jackets.

HEIGHT OF WATER

Thermo-syphon System: To circulate properly, water must be kept above the level of the top opening of the radiator from the engine. Below this point circulation ceases and water boils.

FORCE SYSTEM

In the force system the engine drives a pump which keeps the water in constant circulation. The pump forces the water from the bottom of the radiator to the inlet at the bottom of the water jacket, through which it flows to the outlet at the top. From here it goes to the top of the radiator and flows through the radiator to the bottom. As it passes through the radiator tubes it is cooled. After passing through in this manner it is again drawn to the pump.

CIRCULATION PUMPS

Practically all pumps are driven by a gear on the crank shaft or cam shaft, so that the motion is positive and there is no slipping. There are three types of circulation pumps in use: the gear type, the centrifugal type and the rotary type.

THE GEAR PUMP

The gear pump consists of two small gears with large teeth, the two gears being in mesh and placed in a casting that fits the gears as snugly as possible. The water enters at one side, where the teeth come together, is carried around to the opposite side in the spaces between the teeth, where it escapes through the outlet.

THE CENTRIFUGAL PUMP

The centrifugal pump acts on the principle of an air blower, and has blades projecting from the hub which revolve at high speed inside of a casing. The water enters at the hub and is thrown outward by the blades of the outer casing.

The rotary pump consists of a ring-shaped casing, within which a disc revolves, the disc being eccentric or to one side of the center of the casing. Through a slot across the disc are two arms, and their ends are pressed against the casing by springs. As the disc revolves the water is forced from the inlet to the outlet by the arms.

RADIATORS

Radiators must be used with either the thermo-syphon system or the force system. They are usually placed in front of the engine and mounted on the frame; but in a few cars they are placed back of the engine next to the dash.

There are numerous modifications in radiators with two leading types: the cellular and the tubular. There is a third type in which the water circulates as in the tubular radiator, but whose general appearance is much like that of the cellular radiator. This is the radiator in which zig-zag pipes are arranged vertically. It should be classed as a tubular radiator, although it is often called the honeycomb.

A tubular radiator is one composed of a series of tubular water passages. These tubular passages may be arranged horizontally, vertically, or at an angle. They may be also bent in a zig-zag fashion that brings about a combination of the horizontal and vertical and a consequent oppositely disposed angular flow of water through the tubes. The object is to imitate or bring about the appearance of the cellular construction.

A cellular or honeycomb radiator is one composed of a large number of individual air cells, any of which may be removed and replaced by another in case of leakage. The air cells may be entirely surrounded by water when the radiator is in operation; and the course of the water circulation through the radiator is not confined to any definite horizontal, vertical or angular course.

In order to cool the water sufficiently, a fan driven by a belt or chain from the engine was formerly attached to the radiator, but is now always attached to a special bracket on the engine. The fan is usually driven by a leather belt, from a pulley on the end of the crank shaft. The belt can be tightened either by raising the fan by an eccentric adjustment, or by bodily lifting the fan and its bearing and tightening a bolt holding it. The bolt should be kept tight. Ball bearings are usually provided for the fan and they should be kept well oiled.

The fan draws a current of air through the passage in the radiator, in addition to that driven through it by the forward movement of the car. There are two types of fans in general use, the 4-blade and the 2-blade type.

Hose Connections: This is one of the most important items under water cooling systems. Hose connections are made of a fabric covered with rubber, so designed as to withstand the moving or the cooling piping getting out of line. At the top of the radiator a pipe is welded on and a rubber hose is used to connect it with the pipe on the top of the engine. On the bottom of the radiator there is also a pipe which is connected by means of a rubber hose to the bottom of the engine watercooling chamber (if it is a thermo-syphon system) or to a water pump.

The water pump is connected to the cooling chamber on the engine by a rubber hose connection.

These rubber hose connections are held water tight by a band clamped around the hose and a small bolt to adjust the clamp.

Due care must be taken that these clamps do not cut the rubber hose.

WATER SYSTEM

Causes for water boiling are numerous. One of the most frequent causes is compression leaks. A very rich mixture is inclined to heat the motor and make it logy.

Hose connections are always fastened by a ring clamp at each end. The inside of the hose is coated with grease. If an old piece of hose is used shellac is generally used. All hose connections must be kept tight at all times.

There is always a fan directly behind the radiator to draw the air through and cool the water. Fans are usually belt-driven from the cam shaft by means of a pulley.

Knocks: It is very necessary for the driver to distinguish the difference between a motor knock and a carbon knock.

a. Carbon knocks are sharp metallic raps that come when the motor is pulling hard or when the spark is advanced too far.

b. A motor knock may be caused by any of the following: Loose connecting rod bearing, loose main bearing, loose wrist pin. All of these knocks have a heavy dull thud. There is another light knock due to the adjusting end of the tappet being low. This is rather a sharp knock and comes regularly at each turn of the motor. A knocking motor should be turned over to the master mechanic at once. When a connecting rod gets loose, it is liable to break and go through the crank case.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH
Motor Truck Officers' Course
THEORETICAL AUTO ENGINEERING
LECTURE X

PRINCIPLE OF CARBURETOR

Figure 3 represents some of the parts of a very simple carburetor. The gasoline from the tank flows past the float needle in to the float chamber F. When the gasoline raises the float to a certain height in the float chamber, the float by means of a suitable lever or arrangement of levers, closes the needle valve and prevents the entrance of more gasoline until some has been used.

As the pistons travels downward in the cylinders on their suction strokes, the air which enters the bottom of the carburetor is drawn through the mixing chamber past the spray nozzle at a velocity so high that it sucks up a spray of gasoline from the tip of the spray nozzle. In the carburetor illustrated the mixing chamber is smaller than the main body of the carburetor so that air will pass through at a fairly high velocity, even when the throttle is nearly closed and the engine is running slowly. The size of the opening in the tip of the nozzle can be adjusted by screwing the needle valve up or down to regulate the proportion of fuel to air. The throttle can be opened or closed to regulate the quantity of charge drawn into the cylinders.

There is another way of compensating for the tendency of the mixture from the mixing chamber with a simple spray nozzle to become too rich at high speed and too thin at low speed. This is by regulating the flow of fuel instead of adding air by means of an air valve. There are two methods of accomplishing this result. These have worked out successfully on carburetors which are used extensively on motor trucks. One is to set the quality of the mixture approximately correct for high speed and wide open throttle conditions, then add gasoline to it to keep the mixture from becoming thin at low speed; the other way is to set the mixture right at low speed and in some way so control the supply of fuel as to prevent the mixture from becoming too rich at high speed or wide open throttle.

Stewart Carburetor—Used on Dodge Cars.

In the Stewart carburetor the size of the primary fuel orifice is increased as the auxiliary is admitted. The primary air supply enters at AA and passes through drilled holes HH, past spray nozzle located in mixing chamber at E. Gasoline from the float chamber comes through passages SS, past needle valve of metering pin P, through spray nozzle at E, from which it mixes with the air to form a fine spray. Whenever the motor requires more mixture than can be supplied to passages H and mixing chamber E, the suction lifts the whole air valve A, thereby admitting more air. As air valve A lifts away from tapered metering pin P, a larger quantity of gasoline is drawn up through the nozzle, thereby maintaining the desired quality of mixture. To the lower end of air valve A, is attached a disk D, which is submerged in gasoline and acts as a dash pot to prevent fluttering or too sudden opening of

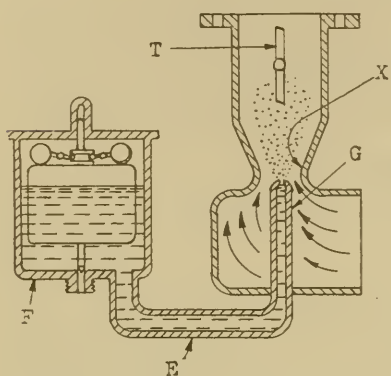


Fig. No. 3.

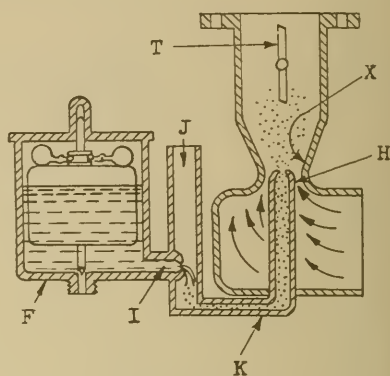


Fig. No. 5.

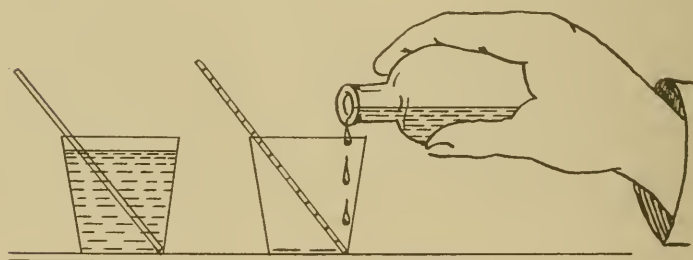


Fig. No. 4.

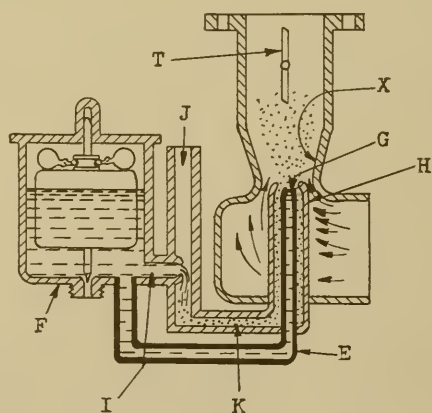
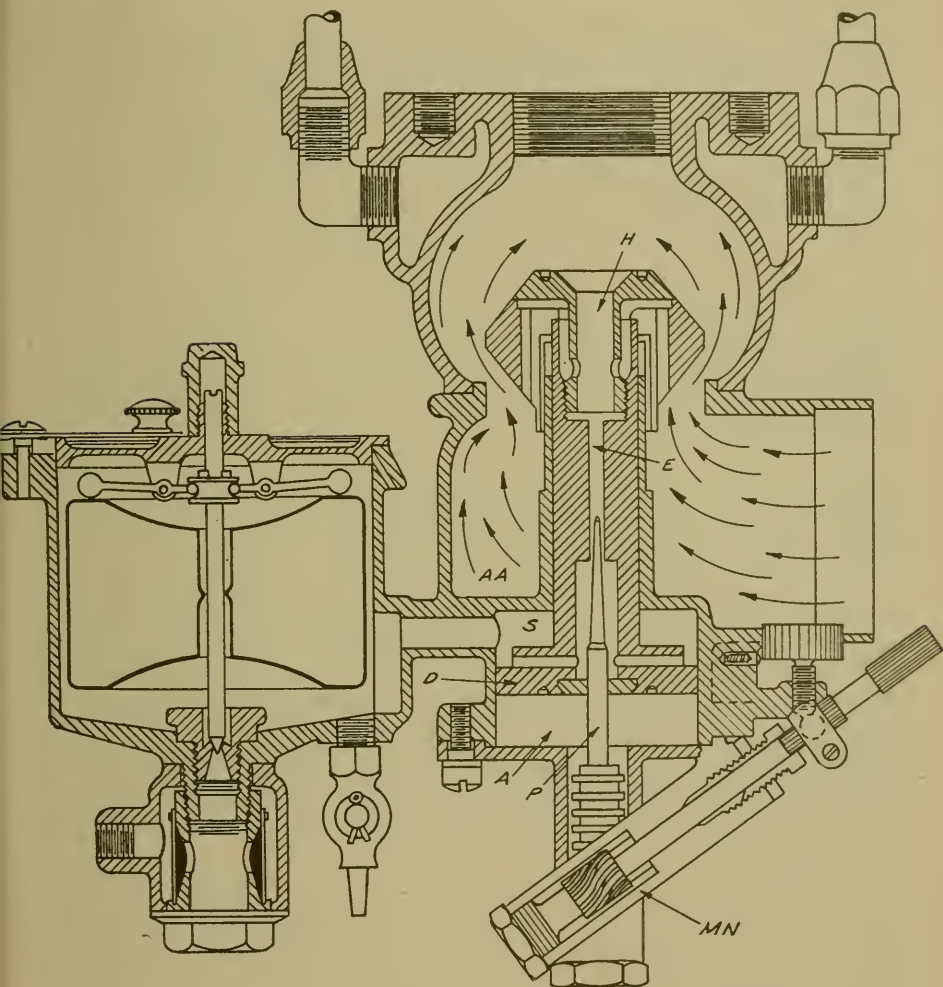


Fig. No. 6.

STEWART CARBURETOR



the air valve. To afford easy means of changing the quality of mixture the height of needle P can be changed by a rack and pinion, MN, controlled from the driver's seat by suitable rod and lever mechanism. With this the driver can secure richer mixture for starting and can thin it out as the motor warms up.

The taper of the pin and the weight of the valve are determined experimentally by the manufacturer and cannot be improved upon by one who is not an expert.

The principle of compensation by use of compound nozzle and gravity fed well (Zenith Carburetor) is illustrated in figures 3, 4, 5, and 6. Figure 3 represents a simple nozzle and mixing chamber, the mixture from which, as already explained, tends to become too rich at high and too thin at low speed. Figure 4 represents two glasses of water arranged with straws; the harder one sucks on the straw on the left hand glass the more liquid he will get. No matter how hard one sucks on the straw on the right hand glass he cannot draw the liquid any faster than it is poured into the glass from the bottle. The harder he sucks the more air he gets with the liquid.

Figure 5 represents the application of this principle to the carburetor construction. The liquid flows through the hole I into the well J. While the engine is running the suction draws the liquid out of the bottom of this well as fast as it runs in. The nozzle delivers a mixture of gasoline and air instead of a solid stream of gasoline. With the increase of air velocity there can be no increase in the quantity of fuel delivered up from the nozzle beyond the rate at which it flows into the well J. The quality of this mixture, therefore, becomes leaner and leaner as the quantity of air flowing through the mixing chamber increases.

Figure 6 represents the combination of the two to form what is termed a compound nozzle. The tendency of one nozzle to supply a mixture which becomes lean as the speed increases counteracts the tendency of the other to supply a mixture which becomes rich as the speed increases. The result is practically uniform mixture under all conditions of load and speed.

When the engine stands idle the well J and the nozzle are filled with gasoline almost to the height of the tip of the spring nozzle. When the engine is cranked this extra supply drawn from the well gives a slightly richer mixture at the start which is especially desirable. A more complete explanation of the actual construction of a carburetor of this type, with full instructions, can be found in the instruction book issued by the manufacturer of a car or of the carburetor. Carburetors of this type are extensively used in France and America both on motor trucks and on airplanes. Being free from moving parts they give very little trouble and require practically no change of adjustment with moderate change of altitude or climatic conditions, a condition not true of a carburetor with air valve compensation.

New Stromberg Carburetor—Used on Liberty Trucks. Embodies several of the features of the Zenith, but does not use a compound nozzle. Instead, it has what is called an "Air-Bled Nozzle." The principle of the air-bled nozzle type: gasoline flows through a needle hole, which is controlled by the needle through the passage, into the well. When the engine is started the air drawn through the larger venturi creates a very high suction at the smallest venturi. This suction draws gasoline through the small vertical drilled holes at the throat of the venturi, through the vertical tube in the lower end of which is a small hole at the bottom of the well.

As the suction becomes higher and higher, due to the larger amount of gasoline drawn, the depth of the gasoline in the well is lowered. As it is

lowered a series of drilled holes are uncovered successively. More and more air is drawn down through the "air-bleeder" and through the holes and mixes with the gasoline in the tube, thereby maintaining a correct proportion of fuel to air in the carburetor. The proper size of the bleeder and the sizes of the holes have been determined by the manufacturer and require no change. The quality of the mixture is regulated by the needle valve.

Feed Above the Throttle for Running Idle.

In plain tube carburetors, equipped with the compound nozzle fitted with a gravity well (Zenith), plain tube carburetor fitted with air-bled nozzle (Stromberg, Holley, etc.), the air velocity through the mixing chamber when the engine is running idle causes insufficient suction to lift the gasoline from the nozzle and produce a mixture. To allow smooth running idle and at low speed, a by-pass tube or feed behind the throttle is generally provided and is arranged with an adjusting screw, by means of which the quality of the mixture produced and fed in at, or just above the edge of the throttle can be regulated. This is called the low speed for idle adjustment needle. The majority of air valve carburetors are fitted with a similar tube. Generally in this case the by-pass is not adjustable.

Throttle Stop Screw.

The throttle arm on every carburetor is provided with an adjustable stop screw so that when the throttle control lever on the steering wheel is placed in closed position, the throttle will be held open just far enough to allow the motor to run idle or at a slow rate of speed without danger of stopping.

Methods of Making Starting Easy.

Many devices are used in connection with gasoline engines to make starting easier and to permit regulation of the quality of the mixture from the driving seat. A flooding device, known sometimes as a priming pin or tickler, is sometimes arranged so that the float may be held down until the float chamber is full and gasoline runs out of the spray nozzle into the mixing chamber and the lower air passage.

A priming or fuel pump is sometimes arranged so that the stroke of the plunger will inject a small stream of gasoline or spray of gasoline into the inlet manifold, or sometimes into the valve ports of the cylinder casting.

A butterfly valve, sometimes called a choker or strangler, is frequently provided so that when it is closed it shuts off part or most of the air entering the carburetor. This insures higher suction and a richer mixture when the engine is cranked. This may be connected with the steering column or dash, so that the driver may use it to regulate the quality of the mixture when the engine is warming up as well as to make starting easier.

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LECTURE XI

VACUUM SYSTEM

The principle of the Vacuum System is not difficult to understand. The tank is divided into two chambers—upper and lower, the upper one being the compartment in which the gasoline from the tank is first received, the lower one is called the emptying chamber and supplies direct to the carburetor. This lower chamber is exposed to the pressure of the outside air (atmospheric pressure) at all times by means of an open passage leading to the air vent. The upper chamber is connected to the gasoline tank by one pipe, and to the intake manifold by another. Two valves are operated by a mechanism connected to the float which operates in the upper chamber. One valve opens and closes the suction pipe to the intake manifold, and the other opens and closes the passage to the air vent. If the entire tank is empty, as happens when the tank has just been installed, the float will be at the bottom of the upper tank, and the suction pipe valve will be open and the air vent valve closed. In order to draw the gasoline to the upper chamber, it will be necessary to crank the motor over several times, with the throttle closed, so that nearly all the suction of the pistons will be exerted through the suction pipe, the upper chamber and the fuel pipe. Thus the gasoline will be sucked from the fuel tank to the upper chamber, as it will be remembered that when the float is down, the suction valve is open, and the air valve closed. It is sometimes necessary to "prime" the upper chamber with gasoline through the small plug in the top to get the flow of gasoline started. As the gasoline flows into the upper chamber the float rises, and when the proper level has been obtained a light spring on the float mechanism snaps the suction valve closed, and the air vent valve opens at the same operation. Thus, when the air valve is open the upper chamber is exposed to the open air.

The usual source of trouble in the vacuum system is caused by a pin hole leak in the float, causing it to sink. It may be seen by the diagram that if the float does not rise, the gasoline will fill the upper chamber and be sucked right through the intake manifold into the suction pipe, without going to the carburetor at all. This condition can usually be diagnosed by the evidence of black smoke and explosions from the muffler, and the "choked" action of the motor, which will hardly run at all. If the leak in the float can be found, it should be soldered, but if it cannot be located, a new float must be installed. These leaks are sometimes so small that it takes several days for the float to become filled and sink, and therefore these microscopic holes are difficult to locate. They may often, however, be found as follows: The float which is filled with gasoline by the leak is placed in a dish of very hot water (nearly boiling), so that the water covers the float entirely. The heat of the water vaporizes the gasoline in the float, and expands the vapor, which will escape through the leak and bubble up through the water. The exact spot must be

marked. In order to get the gasoline out of the float it is usually necessary to punch a little larger hole right where the leak is to be repaired, so that the gasoline can run out. Use very little solder, as too much would increase the weight of the float, to an extent that it may not operate properly.

Other troubles usually comprise the sticking of some part of the valve mechanism, or the sticking of the "flapper valve" between the chambers. These parts may be inspected by removing the cover of the tank.

On almost every truck there is a suitable shut-off cock beneath each fuel tank and with it there is generally some form of trap to catch water with a screen or strainer to hold back any dirt or foreign matter which might obstruct the gasoline line or the small passages in the carburetor. The driver should be familiar with the location of this shut-off in order that he may turn it off instantly in case of fire. It is advisable to open it at least once a week.

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LECTURE XII

RADIATORS

A cooling system is necessary for the proper working of a gasoline engine, because otherwise the very high temperature produced by the combustion of the gases in the cylinders would make the piston and cylinders red hot. This would, of course, destroy the lubrication and cause the pistons to "freeze," and would cause ignition of the mixture of fuel and air as soon as it entered the cylinder, or at least before the end of the compression stroke. This is avoided by providing a cooling system which consists of water jackets in which the water circulates about the cylinder wall and valves, a radiator for cooling the heated water, and some means of circulating the water through the system.

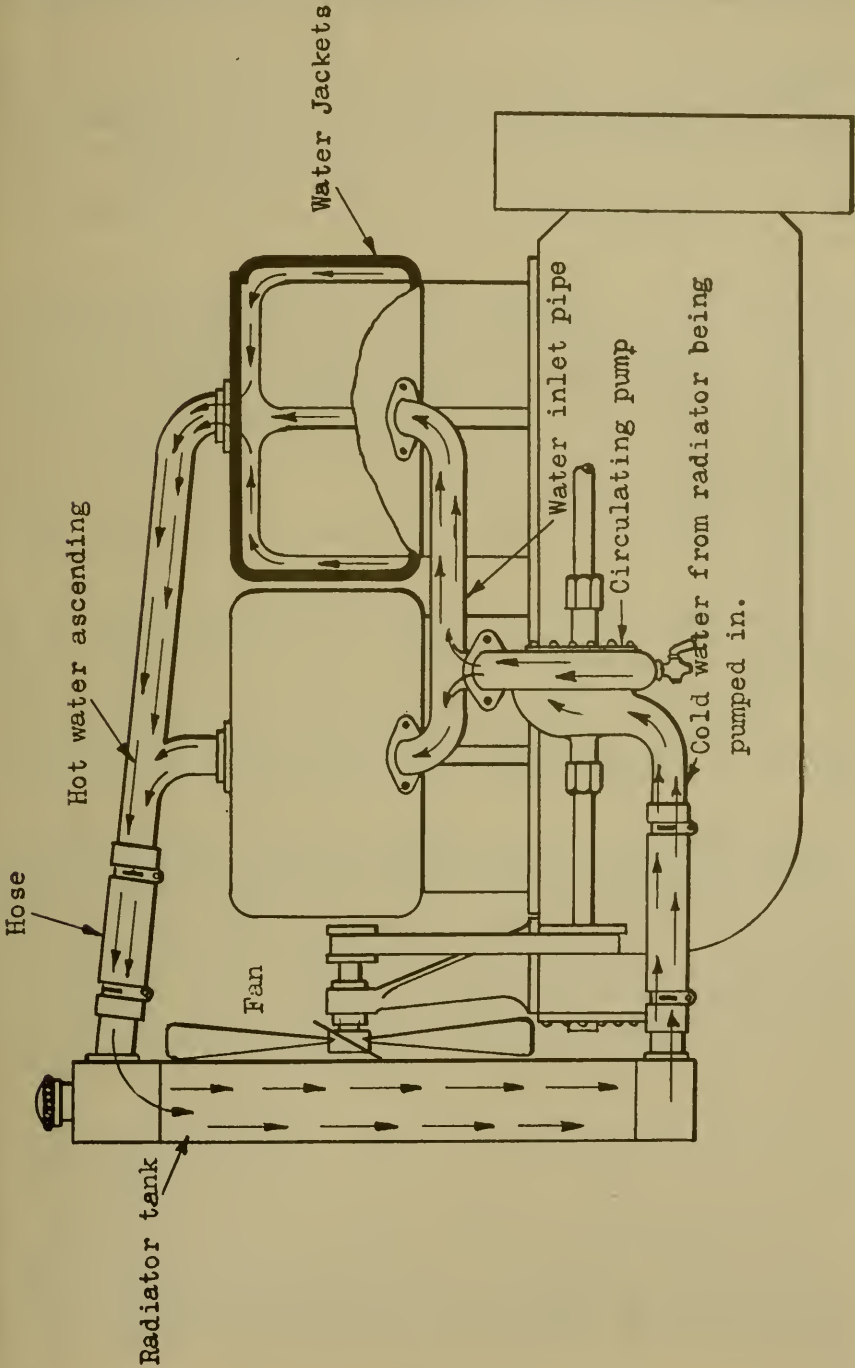
Engine cylinders are sometimes cooled by air, particularly on motorcycle and light weight revolving cylinder airplane engines. Practically all trucks and cars used by the Quartermaster and by the United States Army are water cooled.

Water cooling systems are divided into two classes, the forced circulation system and the thermo-syphon circulation system. The latter is seldom used on trucks. In the thermo-syphon system the water, which becomes heated in the jackets surrounding the cylinders since it is lighter than the cold water in the radiator, flows upward into the top of the radiator, and is replaced by cold water which flows from the bottom of the radiator into the jackets. This is exactly the same principle as is employed in circulating water from the back of a stove to the water tank in the hot water system in the kitchen.

In the force system a pump, which may be driven by gear, chain or belt, draws the water from the bottom of the radiator and forces it through the water jackets around the cylinders and out into the top of the radiator. From there it flows down through the radiator and is cooled before reaching the pump, ready again to travel the same path. A fan, which is generally belt driven, is provided to draw air through the radiator and is necessary to secure sufficient cooling, especially when the truck or car is driven with the wind or when it is operated in low gear.

Proper temperature of cylinders has much to do with the efficiency and smoothness of engine operations. If the cylinders are too hot, the engine will pound and the lubrication will not be satisfactory. If the engine is too cold, the fuel economy will generally be poor and the engine will not operate smoothly. If the temperature of the water is kept as high as possible without the danger of boiling, better economy and smoother running will result. If, after the engine has made a long hard pull, the radiator is so cool that the hand may be placed on top of it without discomfort, it is almost a certain indication that fuel is being wasted.

The motometer or radiator-thermometer is used to indicate the radiator temperature and its purpose is to prevent serious trouble by informing the



driver that the water is boiling or that the water is too cool for efficient operation.

A device known as a thermostat is sometimes provided for regulating the temperature of water which circulates around the cylinders. It prevents the water from flowing through the radiator and becoming cooled until the desired temperature has been reached, and then maintains that temperature. Sometimes a permanent shutter arrangement, or simply a curtain or piece of cardboard, is used to cover a portion of the radiator and prevent over-cooling of the engine in cold weather.

The radiator for a truck may be of either honey-comb or tubular construction. The cellular or honey-comb radiator is composed of a great number of cells through which the air is drawn by the fan or driven by the speed of the machine. The construction of a honey-comb radiator is rather delicate, and when such a radiator is used on a truck it is generally supported on special springs to relieve it of part of the road vibration and some of the twisting action to which it would be subjected if rigidly bolted to the frame.

Tubular radiators may be made with a great number of vertical tubes provided with a series of continuous horizontal fins to increase the cooling effect, or each tube may have independent fins.

Recently a great number of truck manufacturers have adopted radiators built with removable top and bottom plates to permit easy inspection, cleaning and repair.

Care should always be taken to avoid filling the radiator with water which contains too much lime or scale-forming matter. Water which produces a thick deposit of lime in the tea kettle will do the same in the water jackets and probably in the radiator.

The stuffing boxes or glands on the water pump should be kept properly adjusted, that is, just tight enough to prevent leakage. The grease cups for lubricating the pump shaft should be given proper attention faithfully every day.

In winter unless an anti-freeze solution with sufficient strength to prevent freezing is used, special precaution should be taken to prevent the freezing up of the cooling system. If plain water is used, it is a very common custom to drain the radiator at night and to refill it in the morning. When a drain cock has been opened, it is generally necessary to run up a wire to remove stoppages caused by sediment. When the water stops flowing, the wire should be tried again so that the driver may be sure that no water remains. On some engines it is necessary to drain at more than one point in the system. Suitable cocks or drain plugs are provided at the bottom of not only the radiator, but also the water pump, the lower water pipes and the cylinder jackets. After the draining is completed, it is advisable to run the engine for a few seconds to make sure that the water pump housing is clear.

At the front the drivers have made a practice of cutting off the fuel supply at the main tank, running the engine until the carburetor is dry, and then placing one or two kerosene side lamps beneath the hood, and blanketing the hood and radiator to prevent danger from frost.

When the weather is below freezing, anti-freeze solutions are often used. Such substances as alcohol, glycerine, calcium chloride and water are used.

Calcium-chloride is objectionable because it has a destructive, corrosive and electrolytic action on some of the metal parts with which it comes in contact in the cooling system, particularly on aluminum or cast iron.

Alcohol evaporates very easily and constant attention is needed to keep the solution strong enough to give the proper protection. Alcohol is desirable because it has very little effect on metal or on rubber connections.

The freezing temperatures for alcohol and water solutions of different strengths are as follows:

25%	Alcohol for.....	0°	Fahr.
30%	“ “	5°	below zero Fahr.
40%	“ “	20°	“ “ “
60%	“ “	45°	“ “ “

A special form of hydrometer is sometimes used to indicate the percentage strength or the freezing point of an alcohol solution.

A mixture of glycerine and water, or possibly better, a mixture of glycerine, alcohol and water is desirable because the glycerine does not boil away. Unfortunately the cost of glycerine makes the use of this solution prohibitive.

When a solution containing a considerable amount of alcohol or of glycerine freezes, the ice formed will be soft and mushy and much like frozen milk and generally no breakage will result provided the water is thawed with a tea kettle full of hot water or a blow torch before an effort is made to crank the engine. It is advisable to blanket the radiator and allow the engine to run idle until the entire radiator has become warm before the truck is driven in the cold.

If a radiator has sufficient capacity to cool an engine properly in the summer time when the temperature is as high as 90 or 100° F., approximately half this capacity will be needed in zero weather if the engine is to be operated at the same desired working temperature. The driver can control the temperature by covering the lower half of the radiator or the lower half and part of the side of the radiator on which the carburetor is located.

When a radiator begins steaming in cold weather it is generally an indication that it has frozen and it should be blanketed immediately and the engine allowed to run idle until it is warm throughout the entire face.

Boiling of the radiator is an indication of some form of trouble. This trouble may be due to a great many causes outside of the cooling system. Driving with the spark lever in retarded position (or with the spark advance rod disconnected), or prolonged driving in low gear will generally cause boiling. A mixture entirely too rich or entirely too lean may be the cause of boiling. A loose fan belt, a broken paddle wheel in the water pump, or an insufficient supply of water in the radiator might also cause boiling. Obstructed exhaust pipe, a dirty muffler, improper valve timing, may also have the same effect. In zero weather overheating is generally the result of frozen radiator, frozen water pipes, or inoperative water pump.

The majority of cooling system troubles can be warded off if a certain amount of care is exercised in operating the car.

However, it will be well for us to refresh our minds with the most important troubles concerning radiation. The most frequent is a leak, which may be repaired in the following manner:

If it is a slight leak the tube can be closed by a pair of pliers; if the seams of the tube open, it will require a section of new tube. The most important repair work in connection with radiators is soldering and one must be quite an expert to do this in a satisfactory manner. On the Class “B” Military Truck, if the tubes leak the cast iron header is removed and the tubes are flanged so they will conform with their seat in the shell casting. In repairing the radiator I have used small white pine plugs, inserting them in the section, and

when they became water-soaked they expanded and choked the leak. In this manner entire sections can be blocked off making a very substantial temporary repair.

Hose connections are also troublesome at times. Emergency repairs such as taping the manifold, and giving it a coat of shellac, or replacing the hose, do not require skilled mechanics. These connections should be thoroughly inspected quite regularly.

In the water pump we sometimes find broken impellers or gears, sheared shafts and stripped packing gland nuts. A broken shaft gear or impeller is indicated by a very hot motor with a remarkably cool radiator and must be replaced. A damaged stuffing box nut can be temporarily repaired by peening. Should the packing gland require new packing, the nuts are backed off, the packing placed around the shaft so that it is wrapped in the same direction that the nut is turned when replaced and tightened up. This nut should be tightened just enough to stop the leak. Briefly, we have outlined the general troubles, and the shop practice on this subject will enable you to make these repairs.

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LECTURE XIII

SIMPLE IGNITION SYSTEM

Time for Ignition.

The time for the occurrence of the electric spark in the cylinder must be changed under certain conditions; this is called the advancing and retarding of the spark. Due to the fact that the mixture takes an appreciable length of time after ignition to develop its maximum pressure, under ordinary running conditions, the spark must occur before the piston has reached upper dead center on the compression stroke. This is done by advancing the spark so that it occurs early, therefore, the full pressure of the burning mixture is exerted on the piston as it leaves upper dead center. The amount of advance depends on the speed at which the engine is running, the amount of load under which the engine is working and the quality of mixture. A spark that is too far advanced will cause the engine to pound. Nevertheless, the spark should always be carried as far advanced as possible without causing the engine to pound.

In some instances automatic spark control is used, also a set spark, the advantage of these systems are that they do not require the attention of the driver.

General Types of Ignition Systems.

Magneto ignition is preferred on trucks because it is less affected by vibration, requires less attention and is generally conceded to be more dependable for this class of service.

The battery ignition is used on the majority of pleasure cars and is now being used in conjunction with the magneto system on trucks using two separate complete ignition systems.

Battery Ignition System.

The main parts of the battery system are the storage battery, high tension coil and distributor. The battery is the source of the electric current. The distributor accomplishes two functions, it contains the breaker points which make and break the primary current, setting up the induced current in the secondary circuit, and distributes the high tension current to the individual cylinders at their proper firing order. The breaker points are two small contact pieces, one stationary and the other one on a movable arm. A small rotor with as many cams as there are cylinders, revolves and separates the two points about $1/64$ of an inch cutting off the current in the primary windings of the coil every time a spark is to be passed in to the cylinder. The points are made of some non-burning metal to prevent their pitting due to the sparking between them as the points separate. To further prevent this, a condenser is used to absorb the surplus current that would have a tendency to keep on flowing after the circuit is broken.

Care of Storage Battery.

Add distilled water each week in just sufficient quantity to cover the plates. Never use anything but pure water. Do not over fill, as it will boil or slop over and corrode the terminals and rot the wood casing.

Take frequent hydrometer readings, the specific gravity should never be below 1.200 or, when fully charged, 1.275 to 1.300.

Keep the top of the battery box clean by wiping off carefully with a piece of waste or cloth. After waste has been used for this purpose it should not be used for anything else as the acid absorbed will cause rusting.

At the first evidence of a green or white coating on the terminals they should be cleaned and coated with vaseline to prevent further rusting. This rust, or sulphate, if allowed to form, will prevent the electricity from flowing into the battery to charge it or from flowing out to operate the ignition system or lights.

Firing Order of a Four Cylinder Engine.—Four cylinder engines are so arranged that there is a power or firing stroke every stroke, or two power strokes every revolution, one beginning as the previous one ends. In order to complete the four cycle evolution of suction, compression, explosion, and exhaust for each piston, it is necessary that each piston have four strokes. As 1 and 4 work together, and 2 and 3 work together, then four strokes, two up and two down, or two revolutions of the crank shaft will give complete cycle evolutions for each piston, with a firing order of either 1, 2, 4, 3 or 1, 3, 4, 2. The crank shaft of a four cylinder four cycle engine is always set at 180 degrees.

A four cylinder engine could be made to fire 1, 2, 3, 4, by having the crank shaft made with one and two on one set of crank arms, and three and four on another; but it would vibrate excessively on account of the rocking motion of firing from one end to the other. Therefore the firing order on all engines is arranged to decrease vibration as much as possible.

Spark Plugs.

A spark plug consists of a center electrode for conducting a high tension current, an insulator made of porcelain, mica or some other suitable substance, a steel shell threaded to be screwed into the cylinder with a suitable asbestos or some other form of packing to make the fit between the cylinder and the shell air tight. Fastened to the outer shell and grounded portion of the plug there is a conductor so arranged that the current which enters the plug in the center electrode must jump a gap of $1/32$ to $1/64$ th of an inch before it can return to the magneto or coil from which it came.

The spark taken from the magneto and from an automobile spark coil is able to jump one-half inch in the open air, five to six inches in a vacuum chamber and generally less than $1/16$ of an inch under air pressure of 80 pounds per square inch.

The spark plug which seems to spark properly when tried out on a cylinder block may fail entirely inside the cylinder because of the greater resistance the spark encounters under the compression pressure.

Due to the intense heat or to accident the porcelain of the spark plug sometimes becomes cracked. This can often be detected by a grating sound when an effort is made with the fingers to wiggle the porcelain of the plug before it is removed from the cylinder.

When a plug has been removed and disassembled and the porcelain is examined it may be that there is a crack so small that it cannot be readily seen.

If the porcelain is rubbed with some dirty oil from the side of the engine and then wiped off clean, even small cracks will show up quite plainly.

A sooty, oily appearance of the spark plug when removed from the cylinder indicates that it has not been working properly. A white or yellowish white clean dry appearance of the porcelain indicates that the cylinder has been firing. Probably the most satisfactory method of testing a spark plug is to exchange plugs between the cylinders or to try out a plug which is known to be good in the cylinder which is misfiring.

If the plug is not to be disassembled it can be cleaned with a brush and gasoline. If it is disassembled water and a little road dust will clean the porcelain without scratching it the way it would be scratched if emery cloth were to be used.

It is important that all the plugs in the engine be set on approximately the same gap. If the gap is over $1/32$ of an inch, the cylinders are liable to misfire on a hard pull. If the gap is set much closer than $1/56$ of an inch the cylinders will probably miss when the engine is running idle.

Testing of a Spark Plug.

In an effort to test a spark plug the driver often unscrews it from the cylinder, reattaches the wire, lays it down on the cylinder casting, taking care that the terminal does not make contact, and watches for the occurrence of the spark while the engine is turned over. The failure of the spark to occur in the plug if one can be obtained from the end of the detached wire is good evidence that the plug is out of order. The occurrence of the spark in the open air is, however, no indication that one will occur under high pressure when the plug has been screwed back into the cylinder.

Whether the spark plug has been firing properly or not can generally be determined by inspection, as a plug which has been missing is liable to present an oily or sooty appearance, instead of a dry yellowish-white, clean appearance which indicates that the cylinder is firing properly.

Probably one of the most satisfactory methods of testing is to try the unsatisfactory plug in a cylinder which is known to have been operating properly, or to try a spark plug which is known to be good in the troublesome cylinder.

To determine which cylinder is missing fire, the plugs may be short circuited one or more at a time with a screw driver or other suitable instrument, or the wires may be detached from the spark plug, one or more at a time. The priming cups may be opened and the issuing flame watched, or the sound noted to determine whether there is any change in sound when the plug is short circuited or the wire detached.

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LECTURE XIV

HIGH TENSION MAGNETOS

The high tension magneto combines all the elements of a complete ignition system. It performs three separate operations as follows: It generates a low tension current: it transforms the low tension current into a high tension current; and it distributes the high tension current to the spark plugs. The high tension magneto differs from the low tension in only a few particulars.

The armature on a high tension magneto has not only the primary winding, but also another winding, consisting of several thousand turns of very fine wire wound around the outside of the primary winding and insulated from it. As the primary current is interrupted by the breaker points a high tension current is induced in this secondary winding. The secondary current is conducted from the winding through an insulated ring on the armature to a carbon brush and from there to the central point of the distributor. The rest of the magneto is essentially the same as has been described in the preceding lecture.

Two features are included in the high tension magneto, however, which do not appear in the low tension, but which are found on many induction coils. These are the *condenser* and the *safety spark gap*.

When the two contact points of the "breaker" are suddenly separated there is a tendency for the primary current to continue to flow across the gap. This would cause a hot spark to be formed between the points, which would not only burn the points away rapidly, but would also prevent a rapid cessation of the current. As the primary current must be broken suddenly in order to get a strong secondary current, a condenser is used to overcome this tendency to flash across the points. In the Bosch magneto the condenser is placed in the hollow of the armature end cover at the circuit breaker end. This condenser consists of two sets of tinfoil sheets, the sheets opposite sets alternating with one another. They are separated by sheets of mica to insulate them from each other. All the sheets of each set are metallically connected to the conductor leading from the primary winding to the stationary breaker points, while the other set is grounded. In other words, the condenser is "shunted" across the breaker points. The action of the condenser is to absorb the excess current that tends to flow or spark across the points after they are separated.

INDUCTION COIL

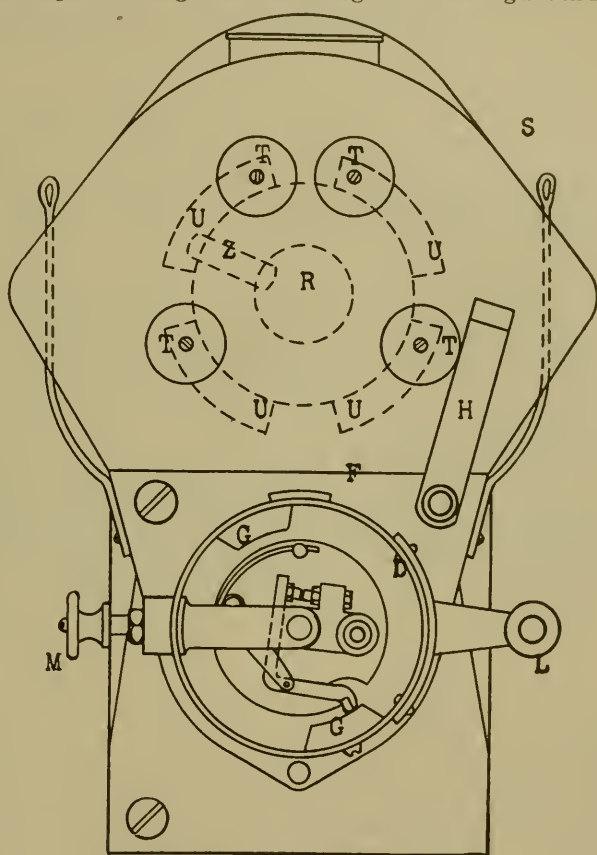
In the lecture on "Elementary Principles of Electricity" we learned that electricity may be generated either mechanically or chemically. The magneto is a mechanical generator and its function is to produce a spark at the spark plugs.

In general, there are two kinds of magnetos, the "low-tension" magneto and the "high-tension" magneto. The "low-tension" magneto develops only a low voltage current, while the "high-tension" magneto not only develops a

low-voltage current, but also changes it to a high voltage, so that it will jump the gap at the spark plug. In ignition systems the low-tension current is called the "primary" current, and the high voltage current the "secondary."

The "distributor" consists of a disc of insulating material in which are embedded on the inner side of one central contact piece R and four contact pieces UUUU which are shaped like segments of a ring. A revolving brush Z driven by a gear from the armature shaft makes simultaneous connection between the central distributor contact R and one of the annular distributor contacts U. Heavily insulated wires carry the current from the terminals TTTT to each of the spark plugs.

The "contact-breaker" consists of a stationary insulated contact point, and a movable contact point on one arm of the bell crank. Both of these parts are mounted on a brass disc which is securely fastened to the armature shaft and revolves with it. The contact-breaker is surrounded by a cylindrical housing F to the interior surface of which are secured, at opposite points, two steel cam-blocks, G and G. Ordinarily, the two contact points A and B are held in contact by a spring H. As the disc D rotates the outer arm of the bell crank



FRONT VIEW OF MAGNETO, SHOWING DISTRIBUTOR.

C comes in contact with the cam blocks G, whereby the contact points are momentarily separated. The stationary contact block A is connected with one end of the primary winding of the armature, through a screw passing the centre of the armature shaft. The moving contact B has a metallic connection to the iron frame work of the magneto, or in other words is "grounded." As the beginning of the primary winding is also grounded to the frame work of the magneto, the primary circuit is thus completed. In a low tension magneto or a battery system, the point B would not be grounded directly, but the current would be led by a wire to the induction coil, where it would pass through

the primary winding and then to ground. When the breaker points in the magneto interrupted the primary current, a secondary would be generated in the secondary winding of the coil.

If the breaker points have too small or too wide a gap they may be adjusted by means of a small wrench and gauge provided by the manufacturer. If they are dirty or sticking, they should be cleaned by means of a strip of fine emery cloth or a watchmaker's file in order to have a perfectly flat, smooth surface. In case the magnets are demagnetized, they should be turned over to the electrician for recharging. When a magnet is fully charged it should lift an iron weight of about ten to fifteen pounds. The magnet is recharged by placing it on the cores of an electro-magnet, North pole of magnet to South pole of electro-magnet. This operation requires usually about one minute.

All the foregoing has been a description of the armature type of magneto. The Dixie magneto as used on Liberty trucks is of another type, known as the inductor type. The general principles of this type are the same, but the rotating element simply has two cast iron inductors which revolve past a stationary armature winding.

The advantages of this type of magneto, as claimed by the manufacturer, are as follows: As the contact breaker box is attached to the mounting of the coil, the latter moves with it when the former is partly rotated to advance or retard the occurrence of the spark in the cylinders, so that the opening of the contact points always takes place at the point of maximum current. An absolute advance of thirty degrees or more is obtained by simply rotating the coil carrying structure to which the breaker box is attached around the axis of the rotating pole pieces.

Inasmuch as the only rotating elements of the Dixie magneto are the two pole pieces, there are no rotating wires to cause trouble by becoming loose. Another great difference between the Mason principle on which the Dixie operates and the armature type is in the fact that the rotating poles in the Dixie do not reverse their polarity at any time, consequently the lag due to the magnetic reluctance in this part is eliminated.

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LECTURE XV

STARTING AND LIGHTING SYSTEMS

A *Conductor* is anything that will permit a current of electricity to pass through it. All metals are conductors, but some are much better than others. Silver and copper are among the best metallic conductors as they offer the least resistance to the flow of current. Silver is a better conductor than copper, but copper is used because it is cheaper. A copper wire, in turn, will carry a much larger current than an iron wire of the same size, because the iron wire offers more resistance than the copper. If a wire has more electricity passed through it than it can easily conduct, heat will be generated and it may get so hot that it will melt. The larger the wire is, the greater the current it can carry without heating.

An *Insulator* is a substance which resists the flow of an electric current completely and will not allow it to pass. Rubber, porcelain, glass and mica are examples of insulators, or non-conductors.

A wire is insulated to prevent the current from escaping by wrapping it with cotton or silk which is soaked with rubber to prevent dampness from getting in. Dry cotton and silk are insulators, but as water is a conductor, when damp, cotton or silk cease to be insulators.

A current of electricity flowing through a wire may be measured just as a current of water flowing through a pipe may be measured. The amount of water that flows through the pipe depends upon two things:

- (1) The pressure or "head" from the pump or reservoir, and
- (2) The resistance that the pipe offers to the flow of the current of water. The larger the pipe is, the less resistance is offered. In the same way the volume of electricity that passes through a wire depends upon the pressure or strength of the source of the current and the resistance of the wire. The pressure of an electric current or the force with which it flows is measured in volts. In other words, the volt is the unit of electrical pressure. Thus a current of ten volts is flowing with a pressure of that amount, just as water in a pipe might be flowing at a pressure of ten pounds.

The volume or quantity of current passing through a wire is measured in amperes. The ampere is the unit of quantity.

The ohm is the unit of electric resistance.

The watt is the unit of electric power. 746 watts equal one horse-power. A watt is equivalent to one ampere flowing at a pressure of one volt, or the product of amperes multiplied by volts give the number of watts.

Sources of electrical energy may be either chemical as in a "battery" or mechanical as in the dynamo, and these will be taken up in subsequent lectures.

The size of wire to use depends upon the amount of current that must flow through it and the length of the wire. The longer the wire the greater the

resistance offered to the flow of current. Therefore, there will be too much drop in the voltage at the wire terminal if it is not of sufficient size. The conductor must be large enough to carry the required amount of voltage to a given point with less than 4% drop.

Nearly all automobiles are using a single wire system and the length of the wire is seldom more than ten or twelve feet. Primary wire is used for low tension or voltage, as ignition, from the battery to the coil and from the coil to the timer, or for lights. It is usually flexible, consisting of several strands of wire. When used for lighting it can be "duplex" or even consist of four wires together and is usually encased in metal armor for protection. Secondary cable is used for high tension ignition currents. The wire is small but heavily insulated. Starting motor wire is very heavy, being several times the size of the secondary cable, but not so heavily insulated. Wire of this kind is used because it does not carry a high voltage, only 6 to 24 volts, whereas the secondary cable carries a voltage high enough to jump a gap.

The starting motor wire carries a large amperage or quantity of current. For instance the wire running from the storage battery to the starting motor, when first starting, must carry from 80 to sometimes 400 amperes, according to the size of the motor. This is only for a few seconds, but large wires must necessarily be used to carry this great quantity, even for such a short time. The wires running from the generator to the storage battery are much smaller, as the quantity of current which passes through them is only 5 to 25 amperes.

As a comparison, imagine water pipes. If it were desired to pass 150 gallons of water through a pipe in one hour it would require a much larger pipe than it would if but 25 gallons were to flow through in the same length of time.

The following table of the sizes of wire to be used in making different connections should be carefully studied by the mechanic.

The connection in electrical wiring should be soldered. The unsoldered connections may work as good as soldered connections at the time of being made, but the resistance always increases. In placing a wire terminal under a terminal nut, as on a spark plug, twist the wire in the direction that the nut turns. When connecting a wire under a nut, a copper or brass washer should be used.

Wiring troubles are numerous if the wiring is not properly done. Oil and grease destroy the insulation, so the wires should be kept as free from this as possible. Moving parts of the motor or car must not touch the wires. Protect the wires from chafing. Avoid frayed ends. Tape all connections made in the wire. Connections must be tight as well as all terminals. These should be inspected, for vibration often jars them loose. A common trouble is one where connections or wire terminals to the storage battery and ground connections to the frame are not properly made. Cable should be used where the wire must make a sharp turn, as vibration from the motor is apt to cause a break in the solid wire.

In the discussion of battery ignition the Delco system will be used to illustrate the general principles, as the basic principles of all other battery ignition systems are practically the same.

The principal parts of a battery ignition system are a distributor and timer, ignition or high tension coil, spark plugs and wiring, the current being furnished by the battery and generator. The circuit breaker, ammeter, automatic spark advance and combination switch are units that the essential to the perfect operation of the system but cannot be included in the list of principal parts.

In the Delco, as well as in other types of battery ignition systems, the battery is the primary source of electrical current. However, the generator and storage battery are so wired that, when the amount of current generated by the generator is greater than that generated by the storage battery, the current from the generator not only charges the storage battery, but is used as the source of electrical current for ignition. Therefore the voltage of the primary ignition circuit never falls below the voltage of the storage battery no matter what the speed of the generator may be, and as the voltage or charging rate is regulated in the generator it never reaches a high voltage that would be destructive to the ignition system.

The electrical current which is furnished by the battery and generator is a primary current, so it is necessary to "step it up" to a much higher voltage in order that it will make a spark at the spark plugs. This is accomplished by an ignition or high tension coil, which has been fully explained in a preceding lecture. The only part of the coil that need be considered here is the addition of a resistance unit that is installed with the coil. The purpose of this resistance unit is to obtain a more nearly uniform current through the primary windings of the coil at the time the contact points open. It consists of a number of turns of iron wire, the resistance of which is considerably more than the resistance of the primary windings of the ignition coil. If the ignition resistance unit was not in the circuit and the coil was so constructed as to give the proper sparks at high speeds, the primary current at low speeds would be several times its normal value with serious results to the timer contacts. At low speed the resistance of the unit increases, due to the slight increase of current heating the resistance wire.

The timer or interrupter in the Delco system is mounted directly under the distributor and is driven by the same shaft. Its purpose is the same as in the high tension magneto; to open and close the primary circuit.

The automatic spark advance is a feature that has been brought out by several manufacturers of battery ignition systems. In the Delco system it consists of a set of weights, marked "governor weights" in the accompanying drawing. The weights are operated on an advance ring and so by changing the position of the sleeve with regard to the distributor shaft proper, in a manner very similar to the operation of a manual advance ring, they advance or retard the fibre timing cam according to the position of the automatic weights. The operation of these weights is also similar to that of the governors on a steam engine.

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LECTURE XVI

ACCOUNTABILITY AND RESPONSIBILITY

This lecture will cover the responsibilities that a driver has: first, to himself; second, to his company Commander; third, to his truck; fourth, to the service as a whole.

First of all, the driver's responsibility to himself. In France you are subjected to a great many temptations and you owe it to yourself and to the Service and to your family to keep your physical being clean at all times. General Orders will be read to you when you arrive in France covering this point and you will be carefully instructed along the lines of personal appearance. You owe it to yourself to have your personal appearance, your clothes and your shoes always above reproach. There is nothing that reflects more credit on the A.E.F. than the personal appearance of its soldiers. England and France have devoted a great deal of attention to that point and America has not devoted enough. When American drivers and either French or British have come together, the comparison sometimes was not flattering to the Americans.

Another point of responsibility to yourself is the spirit with which you enter into your work, the pride you have in your organization and the personal pride as regards your own discipline in camp or on the road or on leave. Do not take the matter of saluting and of respect for superior authority as an odious job. When a man salutes you he salutes the insignia which you carry on your collar and your shoulders. That insignia means the Flag. It means the President of the United States. Its real meaning, if spoken by word of mouth, would be: "I respect the responsibilities which the President has delegated to you. I honor my Flag and my Country and I am ready to carry out your commands." When you return the salute your meaning should be: "I know your loyalty and I shall try to lead you to the best of my ability." Never allow yourself or your men to be lax in the matter of saluting. In fact, in France this matter of saluting is of paramount importance. The closer you get to the line or to the Front the more rigidly this regulation is enforced.

Your responsibilities to your Commanding Officer are as follows: You must be absolutely obedient to his orders. Accept them without question or delay. He has additional information about certain movements of troops, certain contemplated changes of location of batteries, the condition of roads, and other things which are unnecessary to advise you of and which for military reasons cannot be published. For this reason when given an order to arrive at a certain point at a definite time, let nothing under heaven interfere with you being there. A tremendous lot may depend on your truck being on time and being at a certain point without any question of doubt or peradventure. When given an order to go to a certain dump, to transport certain definite quantities of supplies, never leave that dump without the required number of

fuses, shells, etc., that are noted on the order. Shells are no good without fuses, and fuses are no good without shells. The same applies to subsistence stores which are hauled from Quartermaster dumps. You do not want the boys in the line who are doing the fighting and risking their lives every second of the day and night to be short anything of any nature that will help them to win out. I want you to feel that responsibility.

Even if your C. O. is not all that you would wish him to be, be loyal and uphold his reputation to the extent of your ability. He represents your company and unless his record is clean in the eyes of other organizations and other people, your company record will suffer accordingly. Whenever your C. O. passes or enters the room where you are resting, never fail to salute. Respect his authority, respect his responsibility, and be always on guard to protect his and your company's reputation.

Likewise you should inspire the same feeling of loyalty in the hearts of your men.

The driver's responsibilities as to his truck and equipment are numerous. He is entrusted with a good many thousand dollars' worth of Government property. This equipment at times has a value which cannot be estimated for several reasons. First of all, due to the lack of ships' tonnage and the activities of the submarine, it is extremely difficult, and up to the present time impossible, to get enough equipment to France to move the freight. Every vehicle must do the maximum amount of work of which it is capable in order to render the service with which the M.T.C. is charged. At times, for strategical and tactical reasons, your truck may be the means of turning the tide in favor of our boys in the lines and at those times your truck off by itself or in company with a few others is beyond estimation of value. One truck driver at Chateau Thierry practically saved the day for our Marines by bringing up machine gun ammunition at the psychological moment under terrific fire and delivering it in full sight of the Germans and in the face of their fire.

This is a type of responsibility anyone may be called upon at any time to bear and each and every one must be ready when the time comes, for there will be no forewarning of the moment, other than that you will get right here in the fundamental requisites. You will have to equip yourself with the ability to assimilate thoughts and place them in reserve so that you can make use of them when the time comes for their application.

Don't think when you go into the field that your responsibility ceases, for it is then just commencing: be particular about the appearance of your equipment at all times. See that your men keep it spotless and in perfect adjustment at all times. When I say spotless, I mean just what that word implies.

You will see British and French equipment when you arrive in France and that sight will be an incentive for you to keep your vehicles clean at all times. When a vehicle is properly cleaned and lubricated there will be a minimum demand for spare parts and supplies. These supplies are very difficult to get in France and we will never have as many as we need. The proper way to clean trucks will be shown to you during this course. You will be shown how to clean engines, what parts, such as spark plugs, porcelains, wire terminals, etc., should be guarded against breakage. You will be shown what parts should be cleaned with a brush and what with a cloth or with waste. The same applies to other parts of the vehicle throughout the chassis. You will not have gasoline or kerosene to get this grease and dirt off quickly, but you will be provided with a solution of sal soda and water which will cut the grease and do just as good a job as kerosene or gasoline, which are such valuable supplies to us. When you have your engine thoroughly cleaned, including the pan underneath, start in on your transmission case, the short shaft between the trans-

mission and the clutch, and the pan and the frame around these assemblies. Then go to the rear axle. Clean the housing, the brake mechanism, the propeller shaft and universals, the torque rods and connections, the brake equalizer and connections, and do not shirk a single thing. Then wash the body and chassis thoroughly. When the entire vehicle has been cleaned it should be gone over carefully with an oil can to lubricate all the connections not supplied with grease cups. All grease cups should be turned down one turn, and if there is any question of whether the grease is getting to the bearings when the cup is turned, the cup should be turned down as far as it will go, and if necessary, filled up again and turned down a second time until the grease actually shows up around the joint or bearing. Make sure that the part is being lubricated. More parts and supplies are needed for motor vehicles because of lack of lubrication than for any other cause. Test the oil in the crank case, in the transmission, in the differential. See that there is always the proper grade and kind of oil for the assemblies. Take off the wheels periodically, at least once a week, and see that the bearings are properly lubricated and adjusted.

There are all sorts of punishments possible and every one is used for men who do not keep up their equipment and who are lax about their discipline and personal appearance. Those punishments vary from K.P. work and extra duty to loss of pay and even court-martial proceedings. As is only right, there are, on the contrary, rewards for those who behave themselves and are careful of the equipment intrusted to them. One system of rewards has been worked out and is in operation in France and consists of extra time off outside of the routine company liberty, and in promotion to higher grades.

The driver's responsibility to the service as a whole is very great and far-reaching. In the present war, motor transport occupies a very prominent place. The German Army, due to the lack of gasoline and rubber for tires, and due to the fact that they have been educated to the use of railroads and horse-drawn vehicles, transport nearly all of their supplies by light narrow-gauge railroad right up to the line. They use a minimum amount of motor transport. On the other hand, all of the Allied Armies, and particularly the French and American Armies, rely almost entirely on motor transportation. Supplies are brought up to what is called the rail-head from the supply depots far in the rear. The rail-head is usually 8 to 15 miles from the front line. From the distributing point to the regimental kitchens, supplies are carried by animal-drawn transport. It very often happens, though, that trucks must deliver supplies direct to the regimental dumps which are immediately back of the line and farther forward than the distributing point. That important gap, which is filled by motor transport from the rail-head to the distributing point, is the area in which you will operate in France. You can plainly see your great responsibility to the service as a whole, which is to move the freight and deliver the supplies, often times under shell fire, over roads that are crowded with guns, troops, vehicles of all description, in sunshine and rain, both night and day, to the boys in line.

MEMORANDUM RECEIPT

All persons subject to the jurisdiction of the Commander in Chief, A.E.F., will be responsible for motor transportation which comes under their care and control. In order to furnish those who may thus be responsible for motor transportation a written evidence of all cases in which they have made an authorized transfer of vehicles, Form M.T.C. 101 has been provided. This form also provides a temporary evidence of transfer pending the receipt of the copy, by the Transferring Officer, of the duly signed receipt of the Receiving

Officer for the vehicle concerned in the transfer. In addition, this form furnishes the basis of statistics to be used in the office of the Director Motor Transport Corps, to enable him to know the status of the M.T.C. equipment of all organizations of the American E.F., in order to intelligently provide for procurement and distribution of said equipment, and repair material therefor.

Where or by Whom Used.

Office D.M.T.C. As indicated under "Purpose" preceding; by persons responsible for motor transportation, in cases where any of the said transportation is transferred to other organizations, stations, etc., or other persons.

System.

(a) At base ports, or other places where motor vehicles are initially received by the American E.F., officers or other persons duly authorized to receive said transportation shall promptly acknowledge receipt of same either by accomplishment of bills of lading, ship's manifests, or on special form of acknowledgment or receipt, required by other departments, transportation systems, factories, etc., or agents of the same, upon delivery to said officers or other persons of motor transport vehicles or equipment. The officer or other person receiving said vehicles will be held responsible for their proper care and preservation, and for the prompt rendition of reports and registration data as required by regulations promulgated by the Director Motor Transport Corps, and for such accounting as may be prescribed.

(b) When any of said transportation is transferred the officer or other person making the transfer will complete the four copies of Form M.T.C. 101 according to the following instructions (which are printed on said form):

(c) "*Original.*"—The original will be prepared by the entry of all data called for on the face of the form. This copy will then be forwarded to the officer or other person designated to receive the motor transportation included in the transfer. In any case where the vehicles are transferred under the direct care of an officer during transit and delivery, the form will be sent in his care, and he will upon turning said vehicles over to the receiving officer, secure his receipt for the vehicles, on said form and forward same immediately to the Transferring Officer, who will retain it for his records.

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CLEANING AND LUBRICATION

In cleaning the truck, the duties of the driver and assistant driver are as follows:

1. *Cleaning Entire Truck.*

Driver is responsible for condition of entire truck, but personally cares for the Power Plant, including—

1. Engine proper
2. Cooling System
3. Carburetor
4. Ignition
5. Generator
6. Dash instruments
7. Engine Controls.

Assistant Driver is responsible for—

1. Clutch
2. Transmission
3. Drive Shafts
4. Rear Axle
5. Rear Springs
6. Brake Mechanism
7. Rear Wheels
8. Front Axle
9. Front Springs
10. Front Wheels
11. Hood
12. Fender
13. Body.

Note.—All grit, sand and mud must be thoroughly removed from all moving parts.

2. *Lubrication Schedule.*

Number of places given for Liberty Class B trucks, other trucks in proportion.

DAILY

1. Fill crank case to proper level.
2. Fan bearing oil, one grease plug.
3. Water pump, heavy grease, two cups.
4. Starting crank, one grease cup.
5. Grease steering connections, four grease cups.
6. Grease steering knuckles, two oil plugs.

7. Oil spark throttle rod sockets and joints, thirteen places.
8. Clutch bearing trunion, one oil plug.
9. Clutch case bearing, one oil plug.
10. Oil spring shackles, eight oil wells.
11. Oil brake rod clevises, twenty clevises.
12. Oil wells on equalizer and intermediate brake bars, six wells.
13. Grease cups on rear axle brake shaft, eight cups.
14. Oil brake shoe equalizer pine, sixteen, eight for each rear wheel inside brake drum.

WEEKLY

1. Drain oil from crank case, wash out with kerosene, refill to proper level.
2. Wheel bearing grease, all four wheels.
3. Grease steering gear case, one plug.
4. Transmission, fill to level.
5. Fill universal joints, four.
6. Differential, fill to level.
7. Two drops oil in magneto, two places.
8. Two drops oil in generator, two places.

Notes:

Use only clean new oil.

Do not fill self oiling wells on Liberty Trucks higher than $\frac{1}{4}$ inch below top of wick tube.

Turn up all grease cups until grease feeds through freely and shows yellow exuding from the joints.

This forces out all dirt from bearings. Wipe off all excess oil and grease. Refilled grease cups must be given at east three turns.

3. Inspect radiator, gasoline tank, and all reserve tanks provided, to make sure they are properly filled.

Inspect complete equipment and report breakage, shortage and repairs needed to Assistant Truckmaster.

1. Tools
2. Supplies
3. Equipment.

4. When the cleaning is done in a formal way, as soon as the duties are completed the driver will report to the Assistant Truckmaster immediately.

5. Truckmaster and Assistant Truckmaster should pass around trucks during the procedure and see that the work is being done properly.

6. Assistant Truckmaster should report to Truckmaster as soon as all trucks in his section are ready for inspection.

7. Truckmaster calls company to attention, receives reports from each section verbally, makes notes on condition, breakage, shortage and repairs needed on each truck. Then upon orders of Company Commander dismisses the company.

It may be well at this time to say that the body and running gear should be washed down thoroughly at every opportunity especially where soft mud is on the wheels or metal parts, owing to the fact that if this mud should be allowed to become hard it is very much more difficult to remove. It is not

alone important to remove that mud which is visible, but the man washing the car should climb in, clean every conceivable place where dirt could possibly accumulate. At times it will be necessary to remove greases, road oils, etc., with gasoline. It is very easy for an inspector who is thoroughly experienced to locate almost instantly those parts which have been neglected. After the car has been thoroughly cleaned the different units that we mentioned a short while ago are thoroughly cleaned, using kerosene and air if possible or whatever cleaning materials that are on hand under the circumstances. The engine should be thoroughly washed down removing all grit and sand from not only the moving parts but others also. All parts that are plate or metal finish should be retained to that standard. The electrical instruments and other important motor auxiliaries such as the carburetor, etc., should be thoroughly cleaned in the same manner. The other units, particularly the clutch, transmission, drive shafts, rear construction, springs, brake mechanism and wheels should receive that attention which will enable them to function properly and therefore eliminate the unnecessary replacement of parts and incidentally prolong the life of the car. The daily and weekly schedules are to be followed very closely and it is the duty of the inspector to see that all grease cups are well filled as often as prescribed. If the proper lubrication of the car is followed in detail, there will be no necessity of oil running out through the rear construction onto the brakes which in many cases is responsible for accidents, and I could mention a number of other cases where too much oil is almost as bad as none at all.

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PRINCIPLES OF MANUFACTURING PNEUMATIC TIRES

A pneumatic tire consists of (1) an air chamber, and (2) an envelope or covering. For the purpose of familiarizing the two parts, we will hereafter refer to the air chamber as the "tube" and the envelope as the "case."

Pure rubber will not vulcanize at any known temperature, and it is therefore necessary to mix it with vulcanizing agents before it can be used as a manufacturing product.

The tube is composed of ninety-five per cent pure rubber, and five per cent sulphur or other vulcanizing ingredient. The compound is first rolled into sheets of about 1/64 inch thickness. It is then cut the desired size and wound on a mandrel of correct dimensions. As it is wound it is also rolled with a concave roller which presses the plies together and makes of the sheet of rubber a seamless tube. The next operation is to wrap it with wet strips of cloth and vulcanize it. When cured, it is removed from the mandrel and the ends spliced together, the valve and valve pad attached, and the tube is ready for service.

The case is composed of clinchers or beads, several plies of rubberized cotton fabric, covered by a rubber cushion, and a wearing surface known as the tread. The bead of the case is that part which fits on the rim of the wheel, and holds the case in position thereon. It is composed of fabric in clincher type cases, and of hard rubber compound, or fibre, reinforced with wires, in the quick detachable type. The former are made to stretch over a one piece rim, and the latter are constructed so that they cannot stretch, and must slide over a two or three piece rim, or to be used only on a quick detachable rim, a split rim, or a divided rim. The Q.D. case is considered the better type, as it has a tendency to stay *put*, when inflated, and is changed more readily.

The fabric is constructed in such a manner that it encloses the beads and is of great strength, each ply having a tensile strength of about 400 lbs. to the square inch.

Pure rubber is a vegetable matter, and will not stand friction nor road traction in its natural state. In order to use it as the wearing surface of the case, it is first necessary to mineralize it by mixing it with certain compounds such as lead, zinc, whiting, ocher, sulphur, etc. Such a process makes of it the best material available for use as the tread of an automobile case, and it usually outlasts the body fabric.

The purpose of the tube is to hold sufficient air pressure to bear the weight of the vehicle, and to furnish a cushion between the wheels and the road, thus eliminating or reducing the shock caused by passing over the uneven surface of the ground. The case is used as a protection and a wearing surface for the tube. If a rupture occurs in the case, it necessarily follows that the air pressure contained in the tube will blow out, resulting in a flat tire.

The principle of the fabric and the cord tire is the same, although the construction is somewhat different. The cotton used in the fabric case is closely woven and has but a thin veneer of rubber solution between the plies. The cord tire is built of walls of stout cord, each cord embedded in almost pure gum, no two cords ever touching to cause friction. The cushion (which is under the tread to absorb shocks) is a thick layer of high grade gum. The beads which hold the case to the rim are especially reinforced. The side wall is also reinforced, giving extra strength against rimcut, and raising the bending point safely high. On some cord tires the cords are secured at the beads with hooks, while in others the cords encircle the beads. The cord tire is much more resilient than the ordinary fabric tire, and has longer life. It stands the road shocks better, and when cuts occur they do not seem to cause as much damage as in the fabric case.

EVERYDAY CARE OF PNEUMATIC TIRES

If tires received the same careful attention as the other units of an automobile, they would give much better service. It seems to be the common practice to watch carefully all other parts of a vehicle, and never look at the tires until they puncture or blow out. In these days of high cost and curtailed production, it is very necessary that tires receive proper care and attention.

Before starting on a trip all tires should be inspected to see if they are properly inflated, or if they have received cuts or bruises which have weakened them to the extent that they are liable to blow out before the trip is ended. If there are cuts which penetrate to the fabric, these should be plugged with rubber putty, or vulcanized at the first opportunity. Otherwise moisture will seep through the cut, loosening the rubber and decaying the fabric.

Overloading the tires has the same detrimental effect as under inflation. The side walls of the tires are bulged at the contacting point with the road, and the different plies of fabric chafe against each other until the rubber between the plies is destroyed, and a blow out is liable to occur. The chafing of the fabric works on the same principle as that of rapidly bending a wire to and fro until it breaks. The tread rubber also separates from the fabric if the tire is overloaded or under inflated.

The car should always be stopped as easily and smoothly as possible. Putting the power on suddenly throws all the weight and power directly on the rear tires, and subjects them to terrific strain, besides the fact that it also does harm to the car in general.

A careful chauffeur will always throw out the clutch, and coast around a sharp corner or turn. Never drive rapidly right up to the stopping point, and then slap on the brakes and slide into place. Always figure out your distance, throw out your clutch and coast to a stop. It is then seldom necessary to apply the brakes. If extreme care is not taken in this regard, the rear tires on a machine will be ruined in a very short time. The effect is the same as placing the case against an emery wheel, and grinding away sections of the rubber. It also weakens the fabric.

Check up the alignment of the wheels occasionally, as tires used on wheels which are not running true will wear through within a few hundred miles.

Keep oil and grease away from the tires at all times. Whenever either is allowed to come in contact with the rubber, it becomes softened and deteriorates rapidly—thereby shortening the life of the case. The rubber of the tube is affected more by the action of grease or oil than that of the case, and soon becomes useless. Care should be taken to keep the proper oil level in the differential housing, for if too much oil is used it will leak out through the end of the axle housing and all over the tire case.

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PRINCIPLE OF CONSTRUCTION OF SOLID TIRES

The solid tires as first used on commercial trucks were composed of cushion rubber with a fabric base, and held in position on the wheel by either internal, or a combination of internal and side wires. But the needs of the commercial truck field became so great that the trucks were made larger and then it was found that a tire so constructed was not suited to the heavier vehicle. After many experiments the metal base tire was invented, and with but few alterations it is the same type of tire that is in universal usage at the present time.

The metal base tire is constructed as follows: A steel base, which is machined on the inside circumference to fit the outside circumference of the wheel band. The outside circumference of the base is corrugated and dovetailed in shape. A copper lining is next applied to its rough face, and it is then ready to receive the rubber compound which is composed as follows: First, a hard rubber compound, which, when vulcanized, acts as a sub-base between the cushion rubber and copper lining on the steel base. It was found that the hard rubber composition would adhere firmly to the copper lining, but not to the steel itself. Under vulcanization the hard rubber compound is compressed into the rough recesses of the steel base, and acts also as an anchor for the rubber part of the tire. The cushion rubber compound is composed of different grades of gum. A slightly harder cushion is applied next to the hard rubber compound and on top of that a high grade cushion, which comes in contact with the road. If the rubber gum were not graduated from a high-grade cushion to the hard rubber sub-base, the resilient compound used as surface rubber would not adhere to the hard rubber sub-base. After the component parts are placed together, the completed tire is inclosed in a mould and vulcanized.

At all times care should be taken to avoid, as much as possible, driving into deep ruts, over rough or sharp obstacles, on car-tracks or against curb stones. This rule also applies to pneumatic tires.

If the rubber is cut near the edge and starts to tear at that point, immediately take a sharp knife and cut off the loose piece, or it will continue to gradually becoming larger and wider, until the cushion will entirely separate from the hard rubber base, and the tire will have to be replaced.

If any cuts occur which penetrate through the cushion rubber to the hard rubber base, clean out all dirt at once and plug the hole. Otherwise the dirt and moisture will separate the hard and cushion rubber at that point, and the cushion rubber will rapidly loosen and fall off from the base around the circumference of the tire.

Overloading and overspeeding affect the tire in nearly the same manner. A rubber band will stretch until it reaches its limit of resilience, when it breaks. Just so, a solid tire will resist compressing under an overload before it is damaged. If it is forced beyond its limit of compression, it will never

have the proper resilience again, becomes dead, and quickly wears out. One instance of overloading on a new set of tires may destroy them for future use, as they are also liable to break loose from the base. When traveling at excessive speed, heat is generated at the union of the steel base and the felloe band on the wheel, and the tendency is for the rubber to separate from the metal base under the extreme heat. The speed that will damage the tires will also be injurious to the truck, and it is poor policy to speed up at any time if it can be avoided.

Driving on car tracks is very injurious to the tires, as that part of the rubber which comes in contact with the rail is compressed more than the balance of the tire, and usually is compelled to support the greater portion of the load. The rail is usually higher than the surrounding road, and there is frequently a space of several inches between the inside of the rail and the pavement. The same precautions should be taken in respect to keeping oil and grease away from solid tires as are observed in the care of pneumatic tires.

Sometimes the metal base is broken in applying the tire to the wheel. It is also liable to become broken from a heavy road shock. To repair, place on a planer and machine out to a depth of $\frac{1}{8}$ " to $\frac{1}{4}$ " clear across the base and about three or four inches on each side of the break. Drill for screw holes and machine a steel plate the proper contour and size to fit. Countersink the holes in the plate and use screws to fit flush with the surface of the base.

RETREADING

When the rubber on the tread surface becomes worn through, or becomes loosened from the body of the case by other causes, it should be retreaded. In other words, new rubber should be vulcanized to the entire circumference of the wearing surface without delay. Otherwise the entire case will be ruined.

To proceed with the repair: First, remove all of the tread rubber, either with a knife or by grinding. Second, remove the damaged part of the fabric on the surface of the case, and scrape all dirt from the surface which is exposed. Third, if for any cause there remains dampness in the fabric of the body of the case, it must be thoroughly dried out before proceeding further. If the repair is made without first eliminating the moisture, such moisture will be turned to steam when the repair is under vulcanization, with the result that at least part of it, and probably the whole of the repair, will not adhere to the body of the case. Fourth, when the carcass of the case has been dried out, roughen the edges of the remaining rubber with a wood rasp or wire wheel, then wash thoroughly with gasoline, allowing the gasoline to evaporate and remembering throughout that cleanliness is most important. Fifth, apply one thin coating of rubber cement, and let it become thoroughly dry (about three hours' time should elapse before applying second coating, and two hours' time between second and third application). *Caution:* Care should be taken to avoid artificial heat, or exposure to the direct rays of the sun, when drying the cement. Exposure to either has a tendency to dry the surface of the cement, leaving still damp that part of it which has soaked into the fabric. Damp cement will blister when the heat of the vulcanizer penetrates to it, and the result is a useless repair. Sixth, when the third coating of cement is thoroughly dry,—Note, the time depends on climatic conditions, from two to three hours in dry weather—repair by reinforcing all weak places, if any, such as nail holes, cuts, etc., with rubber impregnated fabric supplied for that purpose. Now apply the new tread repair gum (or rubber). Note: Some repair gum is callendered the proper contour and thickness ready to be applied.

Otherwise, it is callendered in sheets of 1/16" or 3/32" thickness and supplied in rolls. To apply tread rubber in this state it is necessary to cut it the desired width and length and build up a tread to the proper thickness. This can be done either on the bench or by applying it to the carcass, ply upon ply, starting with a narrow strip in the center and graduating each succeeding strip until the tread is finished. Care should be taken to roll thoroughly, starting on the center, a process which will force the air from in between the new tread and the carcass of the case. If any air remains, it will show in bubbles, and can be easily removed. Note: Never stretch the raw gum, or it will contract badly if cut after it is vulcanized. Seventh, the repaired case is now ready for vulcanization. Proceed as follows: Place a form, according to size, inside of case; next encircle case with strips of wet cloth, cut on bias, and of sufficient width to cover the complete contour of same. Next apply split rims (correct size) and wrap securely, proceeding crosswise until the whole repair is enclosed. It is now ready to be placed in the vulcanizing kettle where steam will be applied. Note: In some instances air bags (air chambers covered with fabric) are used inside the case in place of solid forms. It is then necessary to inflate them after wrapping. The object of placing forms inside, and wrapping outside is to hold the shape of the case and apply pressure to rubber and fabric so that a perfect adhesion will occur.

To Repair a Blowout proceed as follows: Remove the rubber from near the break, and cut it back about four inches. In most cases it has to come off from bead to bead. Next bevel the edges of the rupture and also the edge of the rubber, making the edges of the rubber rough by using a wood rasp.

Note.—The new cement and rubber will not adhere properly if the surface is left smooth. If the break is near the bead, it is necessary to take one ply of fabric off over the bead to the inside of the case. Scrape the inside of the case to remove all dirt from the space to be cleaned, which extends lengthwise about four inches beyond the point at which the rubber stops, and from bead to bead. Clean as in retreading, and cement the whole space where new material is to be applied. Fill in the hole with rubber gum, and reinforce with frictioned fabric supplied for that purpose. Fill in with rubber to the proper thickness, following same instructions as in retreading, and the repair is then ready for the vulcanizing mould. Cord tires are usually repaired in a like manner, except in the Goodrich Silverton Cord, for which special cord sections can be supplied when necessary.

The material used in new cases cures at approximately three hours at 30 pounds steam pressure; but if repair materials took as long to cure, the case would probably be badly burned. Most repair gums and fabrics therefore are short curing materials, and the heat necessary is approximately one hour at 40 pounds steam pressure. Sectional or blowout repairs are cured in a mould made for that purpose. Such a system applies heat only to that part of the case which has been repaired. Retread repairs are vulcanized in a steam kettle, in which live steam is applied to the complete case.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH
Motor Truck Officers' Course
THEORETICAL AUTO ENGINEERING
TYPICAL QUIZ QUESTIONS

1. Name the different establishments in the M.T.C.
2. What is their relation to one another?
3. How do the supply depots function?
4. What are the duties of the M.T.C.?
5. What is the object of a close check on defects?
6. Name the four strokes of the cycle.
7. Name the parts of the piston assembly.
8. What is the purpose of a carburetor?
9. What is the purpose of ignition?
10. Of what material is the frame made?
11. How can the play of the steering gear be adjusted?
12. Name two types of front and two types of rear axles.
13. What is the purpose of a transmission?
14. What is the purpose of a clutch?
15. What type of brake is used on Class B truck?
16. Name two systems of lubricating motor.
17. What is the effect of too much oil in rear axle?
18. What individual attends to company repairs?
19. Name class of repairs made in Service Park.
20. How would you determine a fouled plug?
21. A short circuit?
22. How is a clogged water system remedied?
23. What causes a carburetor to back fire?
24. Define a rich mixture.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH
Motor Truck Officers' Course
THEORETICAL AUTO ENGINEERING
TYPICAL QUIZ QUESTIONS

1. What is the general valve clearance?
2. How is this adjustment made?
3. Explain a simple carburetor.
4. Name the parts of same.
5. What is the result of a water logged float?
6. What is the result of a dirty jet?
7. How would you proceed to check up a vacuum tank?
8. What would result if strainer is plugged?
9. What results from a leaky float?
10. Explain how you would repair a leaky float.
11. What is the purpose of a radiator?
12. Name two different types.
13. Explain how you would make repairs to (1, tubes; 2, cells).
14. What is the object of an induction coil?
15. What is the object of a distributor?
16. How many cells to the 6 volt battery?
17. What is the usual firing order of a four cycle motor?
18. What is a high tension current?
19. What is the function of a breaker?
20. What is necessary to complete a lighting circuit?
21. How would you detect a grounded wire?
22. What are the responsibilities of the company mechanic?
23. What is the difference between a cord and fabric tire?
24. What is the result of jamming on brakes?
25. What is the result of driving on car tracks?

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
THEORETICAL AUTO ENGINEERING

TYPICAL WRITTEN EXAMINATION QUESTIONS

1. Name three types of motors.
2. Name five essential parts of same.
3. Explain the office of a piston.
4. Name four standard makes of carburetors.
5. Why is the magneto preferred to the battery?
6. Name two types of clutches.
7. How would you proceed to reline same?
8. What is the purpose of the transmission?
9. Name one trouble.
10. What is the office of a universal joint?
11. Name types of rear construction.
12. How does the differential gear work?
13. Explain how you would replace a broken spring.
14. How to straighten a bent front axle.
15. Proceed to explain the method of lining up front wheels.
16. What causes rim cuts on tires?
17. How would you repair a puncture?
18. Is it possible to use a blown out tire?
19. How does a wheel out of line affect the tires?
20. Explain two systems of lubrication.
21. Where is grease generally used?
22. Why?
23. What is an overhaul park?
24. Is a service park a mobile unit?
25. What class of repairs are made in a reconstruction camp?

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
MILITARY INSTRUCTION

FIRST WEEK

	Hours
Organization of Companies; issue of equipment, Instruction in arrangement of Beds and Lockers and in Barracks Regulations	8
Evening Study Hours.....	8
Practice marches, three, without arms.....	3
Drill:	
Physical	2
School of the Soldier.....	4
School of the squad, close order, without arms.....	3
Position, Aiming and Sighting.....	3
	— 12
Conferences:	
Care of Arms and Equipment.....	1
Infantry Drill Regulations.....	6
	— 7
Pages 7 to 19, Incl.	
Pages 25 to 29, Incl.	
Pages 36 to 38, Incl.	
Pages 40 to 41 to Par. 122, Incl.	
Written examination on School of the Soldier (Saturday)...	2
	— 40

SECOND WEEK

Evening Study Hours.....	10
Practice march, light kit.....	2
Drill:	
Physical	3
School of the Squad, close order.....	6
School of the Company, close order.....	6
Position, Aiming and Sighting.....	3
Training in Giving Commands.....	3
	— 21
Conferences:	
Infantry Drill Regulations.....	11
Pages 30 to 34, up to and incl. Par. 94.	
Paragraphs 98 to 100.	
Pages 39 and 49 to 58, incl.	
Care of Equipment.....	2
Written examination on School of the Squad (Saturday)...	2
	— 15
	48

THIRD WEEK

	Hours
Evening Study Hours.....	10
Drill:	
Physical	3
School of the Company, close order.....	12
Position, Aiming and Sighting.....	6
Training in Giving Commands.....	3
	— 24
Conferences:	
Small Arms Firing Manual, Parts 2, Chapters 1, 2, 3, and 4.	
Field Service Regulations, Part 2, Articles 1 and 2.....	3
Convoys, pages 65 to 68, inclusive, and Article 4 (Part of the	
time allotted for conferences on Field Service Regula-	
tions should be used for written quizzes.).....	8
Written examination on School of the Company.....	3
	— 14
	48

FOURTH WEEK

Evening Study Hours.....	10
Drill:	
Physical	2½
School of the Company, close order.....	5
Range and Gallery Practice.....	16
Training in Giving Commands.....	2½
Inspection of Arms and Equipment.....	2
	— 28
Conferences:	
Manual of Interior Guard Duty, Paragraphs 1 to 156, incl...	5
Final written examination on Infantry Drill Regulations....	4
	— 9
	47

Note.—The Military Instruction given during the Fifth to Tenth Weeks of the Course is designed to cover a two hours' period daily, with an additional five hours per week of conference and study.

FIFTH WEEK

Evening Study Hours.....	5
Drill:	
Physical	3
School of the Company, close order.....	6
Mounting Guard, Conduct of Guard, etc.....	3
	— 12
	17

Study:

Manual of Interior Guard Duty, Paragraphs 157 to 307, incl.

Note.—Conferences will be held during study periods or in Barracks during inclement weather.

SIXTH WEEK		Hours
Evening Study Hours.....		5
Drill:		
Physical	2	
School of the Company, close order.....	6	
Mounting Guard, Conduct of Guard, etc.....	4	
	—	12
		17

Study:

Manual of Interior Guard Duty, Par. 337 to 367, incl.

Tables of Organization, U. S. Army.

Note.—Conferences will be held during study periods or in Barracks during inclement weather.

SEVENTH WEEK		Hours
Evening Study Hours.....		5
Drill:		
Physical	2½	
School of the Company, close order.....	6	
*Road Sketching and Map Reading.....	3½	
	—	12
		17

Study:

Rules of Land Warfare, Pages 11 to 37, inclusive.

Army Regulations, such portion thereof as pertains to the management and training of Company, practical instruction and use of all blank forms pertaining thereto.

Note.—Conferences will be held during study periods or in Barracks during inclement weather.

EIGHTH WEEK		Hours
Evening Study Hours.....		5
Drill:		
Physical	1	
School of the Company, close order.....	6	
Pistol Practice	2	
Road Sketching and Map Reading.....	3	
	—	12
		17

Study:

Field Service Regulations, Part II, Article I, and Article V.

Note.—Conferences will be held during study periods or in Barracks during inclement weather.

NINTH WEEK		Hours
Evening Study Hours.....		5
Drill:		
Physical	2	
School of the Company, close order.....	6	
Road Sketching and Map Reading.....	2	
Pistol Practice	2	
	—	12
		17

*As given in pamphlet on subject issued by A.G.O.

Study:

Such topics as have not been fully covered or require additional study.

First Aid—Personal and Military Hygiene.

Note.—Conferences will be held during study periods or in Barracks during inclement weather.

TENTH WEEK		Hours
Evening Study Hours.....		5
Drill:		
Physical	2 ½	
School of the Company, close order.....	5	
Company Ceremonies	2 ½	
Training in Giving Commands.....	2	
	—	12
		17

Study:

Such topics as have not been fully covered or require additional study.

Note.—Conferences will be held during study periods or in Barracks during inclement weather.

All students are required to memorize the following:

Definitions (I.D.R., Pages 7 and 8).

Position of the soldier.

Squads right and squads right about.

Marching by the flank.

To the Rear—March.

Manual of Arms.

General Orders of a Sentinel on Guard Duty.

Inspection of barracks, or arms, or both each Saturday during this course, of about one hour duration.

All students will be prepared to take written examinations on Infantry Drill Regulations and other subjects studied during this course in the ninth and tenth weeks.

Instruction in Gas Defense will be given during time allotted for range practice, by special assignment.

SUPPLEMENTARY LECTURES

Motor Truck Officers' Course

The following two lectures are to be given as special lectures, by special assignment, to all officer and officer-candidate students.

LECTURE I

DUTIES OF THE MOTOR SUPPLY TRAIN COMMANDER

LECTURE II

DUTIES OF THE MOTOR TRANSPORT OFFICER

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
SUPPLEMENTARY LECTURES

LECTURE I

DUTIES OF MOTOR SUPPLY TRAIN COMMANDER, INFANTRY DIVISION

This officer has the rank of captain in the Motor Transport Corps. His duties are primarily those of any commanding officer in command of troops, such as those pertaining to administration, discipline, sanitation, etc. A knowledge of these things is a primary requisite to successfully command any unit. A thorough knowledge of army administration plus additional administrative duties, as outlined in course of instruction M.T.C., must be thoroughly acquired. The punitive articles under which summary court cases may be tried should be carefully studied, as well as the method of drawing up a set of charges.

Sanitary rules and regulations covering the location of latrines, their dimensions and distance from camp, etc., police of quarters, kitchen and mess hall, disposition of garbage, and personal hygiene should be carefully studied. But there are some duties peculiar to Motor Transport Work which we will take up in this session.

A very good slogan has been suggested by the A.E.F. for field operations in the Motor Transport Corps and it is "SERVICE FIRST." This must always be borne in mind not only by the commanding officer whose duties are to be outlined here, but by every member of his command. Never forget that you are in the service of the United States Army and that your function is to move the freight and make it possible for the men in the line to fight. This entire organization, which has been so carefully worked out, as well as the organization of all other staff corps and services, is for one purpose and one only, namely, that those who are risking their lives on the firing line will not do it in vain or unnecessarily, that they will want for nothing which will make for the success of our arms.

In the selection of a site for a camp and headquarters, the Supply Train Commander may not have much to say, as certain reconnaissance work is done in advance by the Motor Transport Officer of the Division, and it is his duty to decide where the train should be located to perform the best service. Certain points of location are left to the train commander, such as the exact terrain to be occupied for barracks and camp, and in this connection a more or less protected spot near a clump of trees or where the parking space for the trucks can be easily camouflaged should be selected. Ordinarily, in the present methods of warfare, trains are billeted in small villages, the men sleeping in houses, while barns and sheds are used for supply and repair establishments. Very seldom will a train be located out in the open or camped under tents. When a division takes over a sector, if it has not been occupied before, entire towns immediately back of the line will be evacuated of all civilian population and turned over to the armies to be used for rest billets and for the various headquarters of the division. The first thing to do when moving into a village is to clean out the houses of all refuse matter, obtain disinfectant supplies from the Division Quartermaster and thoroughly cleanse the buildings and barnyards to be used.

Next, quarters must be assigned to the various companies, a headquarters house or building selected and telephone connections with divisional headquarters immediately arranged for. If it is impossible to get a telephone line run into the building which is to be occupied as headquarters, the train commander should find out where the nearest army telephone station is located, go there himself and see that the operator or individual who answers that phone knows him and how he can be reached. This is very important and should be one of the first considerations when taking a command in a new area.

The train commander should find out if the water in the vicinity can safely be used for cooking and drinking purposes and if it is in sufficient quantities. If there is any doubt in his mind about the purity of the water he should have his medical officer examine it at once.

Existing rules of the town and the area established by the military police should be posted. The commander should ascertain the location of ammunition depots, engineer dumps and quartermaster dumps and study the maps carefully to find out the best routes to be followed in the area. He should locate the service park which will be assigned for repairs, arrange for gasoline, oil and wood supplies and get any other information which will be of value to him in the administration of his train and the carrying out of his duties.

In arranging a park for vehicles, never pick out a dead-end street or area, made up of soft soil. All the vehicles should be kept together so as to be more easily accessible and more easily guarded. Care should be taken to line the vehicles up well and have an equal distance between them. There are two methods most generally used in aligning vehicles. One is to dig a shallow trench not over 6 inches deep and 6 inches wide, the full length of the park and make it a rule that all front wheels must rest in this trench. Two or more lines of trenches may be dug about 20 feet apart, so that two columns of vehicles facing each other will result. Another system of alignment is to set up posts about 6 feet high and about 40 feet apart and have each vehicle line up with its radiator cap on a line with these posts.

No other thing creates a more favorable impression upon a staff officer or an inspector coming into the area than the orderly arrangement of vehicles and the general cleanliness of a park. An inspector of Motor Transportation in France said recently, "I have never known my first impression of a park or camp to be altered. If I see the vehicles carefully lined up, clean and in apparent good repair, if I see all salvage material carefully piled up in one place, if the parking space and the camp are well policed, I immediately know that I am going to find efficiency in that outfit."

When vehicles return from duties to the park they should never be allowed to stand by the roadside, but it should be insisted that they be placed in orderly manner in the park and in the space designated for them.

It is a good idea to establish the light repair trucks in a building and if possible to obtain the lumber, have the mechanics construct benches and get their facilities in shape to handle the class of repairs that they will be called upon to make.

Having established and organized his camp the work of the commander has really just begun. He should take a careful reconnaissance of the area in which he is to operate. He should study the roads and if, in his opinion, certain roads are very unfavorable yet have been prescribed by the Division M.T.O. as roads for the operation of the train, recommendations will be made to him for changes. Be very sure that you are right before making suggestions of this kind.

Inspection will be made of road conditions around the quartermaster, engineer and ammunition dumps and if there are bad holes or places that are liable to hold up trucks, arrangements made to have them repaired. If the road menders are too busy to handle the job, the train commander should send a truck or two with a detail of men to do it. Don't wait for the organization that is supposed to do the work for there may be far more important work elsewhere. If later on you are called upon to explain why your train fell down and you couldn't do its work the excuse that your trucks got mixed and tied up at the dumps would fall very flat. Excuses are not expected or accepted when troops are in combat, nor at any time in the army for that matter. Every service and every unit of the division has to cooperate with every other and at times do things that do not exactly come under their jurisdiction. Your duty is to move freight to the line and any preliminary work which must be done to serve that end is your work and your duty.

A dispatching system will be arranged so that there will be a constant check on where trucks are at all times and how many are available for service. The dispatcher (a non-commissioned officer), in nearly every instance is best placed at the railhead where the quartermaster and engineer dumps are located. The camps will be located close to the railhead and if it is in very close proximity, the dispatcher's office can just as well remain in the headquarters buildings. The dispatcher receives all calls from division headquarters and from other sources and, so far as possible, consolidates the loads and trips. For example, if three trucks are transporting subsistence to one sector or distribution point, four trucks to another, twenty to another, and so on they will all load at the same time and report at a given time at a central point in or near the yard of the railhead. This hour of meeting is laid down by the dispatcher who holds the trucks until all proceeding in the same direction have reported, then starts them off in one convoy. The first trucks to drop out are placed at the end of the convoy. On the return trip the same procedure is followed—all trucks meet at a given point and at a given time to form the return convoy. It is much easier to handle a convoy of trucks on the road than single vehicles. It is sometimes advisable if operating over a large area to establish a sub-dispatcher at a central point nearer the line and have all trucks report to him both going and coming. In this case he can form the convoy for the return trip and order trucks after they have been unloaded to proceed elsewhere for a load of salvage material, thus avoiding the "empty" run home. Constant vigilance must be exercised to obtain capacity loads and increase the ton-mileage of the train. Efficiency of a train will be measured by its ton-mileage and unnecessary mileage-empty spoils its record.

Some of the factors contributing to low ton-mileage and to a poor record for the train are:

1. Lack of discipline.
2. Too many trucks out of service through lack of adjustment or repair.
3. Improper attention to routing and dispatching of trucks.
4. Lack of cooperation with other corps and services.
5. Inefficiency of non-commissioned officers.

The above are main factors only. Any inefficiency throughout the command will contribute to low ton-mileage, so it behooves every officer to build up the "esprit-de-corps" of his unit to the highest pitch. Pitting each company against the other and creating inter-company rivalry will be of inestimable value in increased efficiency. The bonus system, equal liberality with promotions as with the summary court aid materially. Every man in the train must thoroughly understand that he will be held pecuniarily responsible for

careless equipment breakages, losses, etc., and the summary court employed to correct these troubles—it is a very useful but unfortunately sometimes abused instrument of correction. True justice toward his men will reward the officer a thousand fold in better “esprit-de-corps,” loyalty and increased efficiency.

Train commanders should make it a point to consult regularly and often with the Division M.T.O. He can do much for them and they can learn much from him. He ought to be their best friend in the area. They should report to him any difficulties they may be having with the Service Park which is handling their repairs or any differences with other corps or services in the division. He will be able to straighten out these troubles much more easily and satisfactorily for all concerned than anyone else, for he is on the divisional staff and knows the channels and methods to follow.

It is impossible to state in a lecture all of the duties the train commander will have to perform. His own powers of observation and resourcefulness will help him most to make a success of his job. But the above suggestions will be found helpful, at any rate.

MOTOR TRANSPORT CORPS
EXECUTIVE DIVISION—TRAINING BRANCH

Motor Truck Officers' Course
SUPPLEMENTARY LECTURES

LECTURE II

DUTIES OF MOTOR TRANSPORT OFFICER

Extract from General Order No. 74 Headquarters A.E.F., 1918, France:
Paragraph 11:

"In each army, corps and division, the army artillery and each section of the S.O.S., there will be an officer of the M.T.S. designated Motor Transport Officer of that command, who is responsible for the efficient operation of the M.T.S. within the limits of the command. His activities are controlled by G-1 in divisions or corps, and by G-4 in marines, in the same manner as are those of the other representatives of technical and supply services in such commands. The functions of this officer are as follows:

"First, he is in command of all Motor transportation of Class 'A' * * * and controls its operation as specified in par. 4.

"Second, he exercises the functions of a staff officer as regards supply of all M.T.S. property for the command and as regards the technical supervision over motor vehicles of Class 'B' provided for in par. 5.

"To carry out this technical supervision, it will be his duty to make frequent inspections of all matters having any bearing on the motor transportation of the command. In making these inspections he will be afforded every facility by all concerned. He will make frequent reports to the branch of the General Staff by whom his activities are controlled, covering such matters as the suitability of the personnel charged with operating motor vehicles, the mechanical condition of the vehicles, the conditions under which they are operated, needs for repair or overhaul, carelessness or waste on the part of any individual or organization and similar matters, together with his recommendation as to any action that should be taken."

(Signed) JAMES W. McANDREW,
Chief of Staff.

Inasmuch as the Motor Transport Officer in a combat division has practically all of the duties of other Motor Transport Officers, a description in detail of his functions will serve the purpose of this lecture. A division Motor Transport Officer is the direct representative of the D.M.T.C. in the field. He is attached to the Staff of the Commanding General of the Division. Division M.T.O.'s are directly responsible to the Assistant Chief of Staff G-1 of the Division for the maintenance and proper operation of all motor transportation in the Division. Army M.T.O.'s are directly responsible to the Chief of Staff—G-4 of the Army to which they are attached. Other M.T.O.'s in charge of geographical sections, overhaul and reception parks are directly responsible to the D.M.T.O. in the A.E.F. There is a M.T. officer for each division, army corps, army, group of armies, section geographical and for such other organizations or districts as are desirable. M.T. officers are not responsible for the

mechanical efficiency and technical operation of the vehicles under their jurisdiction. They directly supervise all M.T.C. repair, supply and salvage agencies and are responsible for the efficient procurement, reception, storage and maintenance of motor vehicles, spare parts, tools, accessories and other M.T.C. materials. They will be directly responsible for the replacement, homogeneous grouping and technical supervision of the motor vehicles pertaining to their unit.

(a) He has an administrative assistant, who is in charge of the administrative branch and charged with all general administrative matters, including office management, correspondence, preservation of records, assignment of records of personnel, military administration of local personnel, general supervision and coordination of the M.T.C. instruction and such other duties as may not be otherwise specifically assigned.

(b) He has a service assistant who is in charge of the service branch and who is responsible for the determination of the actual efficiency of the M.T.C. in all its activities and suggestions for the betterment thereof; compilation of all statistical information, questions of organization and proposed projects, and liaison with corps and services. All contemplated changes in policy, regulation or forms affecting the M.T.C. are referred to him to assure proper coordination thereof.

(c) There is an assistant in charge of operations, who is responsible for the assignment, homogeneous grouping, and technical supervision of all motor vehicles, as defined by par. 3, G.O. No. 74, for their operation in accordance with the terms of the before mentioned order, and for the establishment and operation of such institutions as are necessary to the proper performance of the duties before mentioned.

(d) There is an assistant in charge of maintenance, who is responsible for the procurement, reception, storage, and maintenance of motor vehicles, spare and repair parts, tools, accessories and supplies, the salvage and evacuation of damaged motor vehicles and the repair of M.T.C. material. He has supervision of all repair, supply and salvage agencies, and is responsible for the establishment of such of these as are necessary for the proper performance of the duties before mentioned.

All of these officers have the necessary commissioned and enlisted force to permit them to group their several activities, and to arrange their duties in such manner as to permit them to concern themselves with their general plans, policies and the selection of competent assistants.

A division M.T.O. is not responsible for the procurement of motor vehicles for his division. This is a function of the army M.T.O., who ascertains the divisions' needs and requirements from the weekly reports M.T.C. Form 118.

M.T. Officers, in order to perform their functions properly, must thoroughly understand and be guided by certain basic principles which underlie the broad functions of transportation. An adequate amount of rolling stock maintained constantly in the highest possible state of mechanical efficiency is the first requisite. For this reason the M.T. Officer's supervision over repair and supply is of the greatest importance.

The avoidance of empty hauling lessens the number of vehicles required, decreases cost, and above all increases the speed of transportation. For these reasons the M.T. Officer will see the prime necessity of so placing material and the M.T.C. operation units which haul the material in such relations to each other that maximum hauling efficiency may be maintained. Correspondingly, the necessity of capacity loads, both of bulk and of weight, is apparent.

The principles of the pooling of vehicles must be followed to as great an extent as is practicable and possible. The rigid assignment of vehicles to small organizations is detrimental to mobility, and greatly increases the number of vehicles necessary.

M.T. Officers must bear in mind that mobility is absolutely essential to efficient operation in the field.

Constructive suggestions for the betterment of the service should be requested by the M.T.O. from all chiefs of services in the division and their subordinates. The M.T.O. must so relieve himself of detail work by adding to his staff and by carefully instructing them in their work that he will be free to consider the broad subject of policies of transportation.

When a division is in the line, in trench warfare, great economies can be effected in the number of vehicles required to deliver the service and in the location of parking spaces, garages, etc., with reference to quartermaster warehouses and dumps, engineer and ammunition dumps, hospitals, etc. When an economy can be effected, the procedure should be to withdraw from those units that are not using their vehicle equipment to capacity, those vehicles first, which are badly in need of repair or overhaul and second, beyond that a certain percentage of serviceable vehicles to be placed in reserve.

The shortage of ocean tonnage and difficulties of production and transportation of supplies has made it impossible to accumulate any reserve of vehicles in the A.E.F. As a reserve is an absolute essential, whether it be in commercial or military activity, it had to be accomplished by drawing from each organization of the division a certain percentage, for example 10%, of its vehicle equipment, to be held for emergencies. The present M.T.C. Tables of Organization were drawn up to take care of a combat division on the move, the period when the maximum strain is placed on transportation facilities, therefore, it is always comparatively easy to withdraw a certain portion of vehicles when the division is stationary. Nothing will indicate efficiency to the Commanding General of the Division more than the establishment of a reserve of transport facilities, no matter how small.

Again, great difficulties will always be experienced by a M.T.O. in obtaining supplies and spare parts in sufficient quantities. It is the constant exercise of resourcefulness and vigilance on the part of the M.T.O. and his staff that overcomes these difficulties and keeps up the standard of service under the most trying circumstances.

Great economies in operation can be effected by the use of a dispatching system worked up in the A.E.F. This system is for the use of headquarters, commands, M.T.C. groups, garages and parks and at all M.T.C. establishments where depot or more or less stationary work is being done. Dispatching usually is directed by a commissioned officer, the head of the operation division, who, in turn, is responsible to the Motor Transport Officer. The actual dispatching usually is done by a non-commissioned officer, or rather, by several non-commissioned officers as reliefs must be provided. A chief dispatcher is a necessity. It has generally been found most convenient to have the organizations doing the camp transportation work furnish the details for dispatching.

A central location for the dispatcher's office is of the utmost importance. It should be near the principal warehouses, dumps or headquarters, if possible, because most of the hauling will revolve about them. It will be reached by good roads and near it there must be plenty of parking space. Generally such a spot will be found near the quartermaster's office. No particular type of building is necessary. One end of a garage or small shed answers the purpose.

Two of the most important adjuncts of the dispatcher are a telephone and the "dispatcher's board." As the calls come in by telephone the dispatcher has but to glance at his board to see what he has available in the way of transportation. When a truck moves out on a trip the "block" or "peg" which represents that vehicle is moved over to indicate it is "out." When the driver returns he reports to the dispatcher, who, by merely moving this peg or block indicates that this particular vehicle is again available. By this system it is possible for one man to keep track of a hundred or more vehicles.

Trucks, motor cars and motorcycles report to the dispatcher in the morning and he at once arranges his board for the day. There will always be some vehicles going to the shop for repairs and the board is so arranged as to indicate their temporary disposition. At any time it should be possible for the Motor Transport Officer to telephone requesting the number of vehicles on duty and get a reply.

To reduce mistakes to the minimum, it is necessary that the dispatcher be supplied with printed order blanks. All requests for motor vehicles should be entered on a pad which permits of a duplicate being kept. The dispatcher tears off one copy and sends it by an orderly to the driver. This greatly reduces the chance of the driver reporting to the wrong place or at the wrong time, and facilitates tracing of such mistakes as may occur. As the bulk of the dispatcher's orders will be received by telephone, it will readily be seen how careful he must be in taking his orders. Experience has proved the advisability of "repeating back" the order.

It takes a high grade of army discipline to make a success of a system of dispatching. Trucks and cars must report on time. Otherwise the entire system will be a failure. The chief dispatcher has his work laid out in advance as much as possible and if, on a day when he is to supply extra demands, only a part of his regular transportation reports, he will have to explain. Hence he must keep in touch with the various truckmasters to learn when trucks are to be temporarily taken off for repairs (except emergency repairs which cannot be anticipated).

The dispatcher must, above all, be a man of tact, possessing judgment to an unusual degree, and must at all times preserve courtesy. He will avoid trouble if he will assume each time he hears the telephone that it is a message from the Commanding General. He must familiarize himself with a map of the area and know the organizations he deals with. He must under no circumstances allow the dispatcher's office to become a loafing place. If he has more trucks at his disposal than are necessary for the day's business he should permit some of them to be taken off. There is always minor mechanical work on a motor vehicle which should be attended to.

Efficient dispatching of motor vehicles requires constant study. Drivers must be watched. If there is a tendency to loaf it must be reported and corrected. Many times loading and unloading of trucks must be done by fatigue details. This class of labor must be spurred into activity. If a truck or car reports promptly it is only fair to expect the cargo or passenger to be ready. Drivers' reports need to be studied as to the cause of delays in order that habitual delays may be eliminated. At some camps, drivers have orders not to wait more than 15 minutes. Unnecessary trips and traveling "light" are to be avoided. Whenever possible in making a long haul and discharging a cargo, a load should be taken on for the return trip.

Motor Transport Companies attached to the various headquarters, and doing depot work instead of convoy work, will observe the following regulations:

Passenger Cars:

(a) Passenger cars will not be assigned permanently to individuals without the approval of the Commanding Officer, unless this authority is delegated to the M.T.O.

(b) When an officer desires a passenger car for a trip of more than 35 or 40 miles, or about 60 kilometers, or for a period of more than four hours, his application must receive the approval of the chief of his department.

(c) Applications for cars for trips of more than 24 hours must be submitted the day before, and upon returning the officer must sign the necessary certificate for commutation of rations for the driver. In no case will motor transportation be requested when rail transportation can be used to equal or better advantage.

(d) When practicable, two or more officers traveling in the same direction will utilize the same car. The senior is responsible for the car and that the traffic rules are observed. If the car is kept out after 8 p.m. a note stating the time and place he was released will be furnished the driver.

(e) All cars will be in the garage from 8 P.M. to 6.30 A.M. and any person who keeps a car out between these hours will furnish the driver with a memorandum to be turned in at the garage stating why the vehicle was kept out and when and where it was dismissed. All drivers upon dismissal will return immediately to the garage and report in. All drivers before leaving the garage will report out to the non-commissioned officer in charge.

Motorcycles for messenger and courier services will be assigned under similar regulations.

Motor trucks: applications for these will be made to the garage one day in advance whenever practicable. In order to use transportation to the best advantage, the approximate tonnage to be moved should be given instead of an estimate of the number of trucks. Trucks will not be used as passenger vehicles except in carrying large parties to and from work, or for the transportation of troops.

In the technical supervision of Class "B" transportation a Division M.T.O. must exercise superior tact and diplomacy. Although G.O. 74 A.E.F. 1918 prescribes that this "technical supervision shall be interpreted very broadly by all concerned" changing and molding policies for the trains of other corps is what might be called ticklish business. By sheer personality and tact a M.T.O. can practically control all the transportation of the Division and effect wonderful results by this unified management.

The M.T.O. or his assistant in charge of operations should make almost daily inspections of Class "A" vehicles in park and on convoy for he is directly responsible for their efficient operation.

Technical supervision as applied to Class "B" vehicles might be defined as:

(a) Making recommendations and constructive suggestions (preferably verbal and to the chief of the corps concerned) based on close observation of the operation of that corps' vehicles.

(b) Establishment of a close relationship with the chiefs of other corps in order to bring about easier and quicker results.

(c) In cases where proper results are not obtained by methods (a) and (b) the making of recommendations for changes and improvements to the A.C.S. G-4 of the Division.

(d) Laying down of standard rules and regulations to govern all transportation in the area whether it be class (a) or (b).

(e) Fixing the priority for repairs at the local Service Park for all organizations.

(f) Instituting a bonus system to reward efficiency of all personnel.

(g) Reporting by memorandum to chief of Corps concerned "any carelessness or waste or inefficiency on the part of any individual or organization."

(h) Inspection of stocks of spare parts, tools and supplies to prevent loading up and hoarding.

(i) Establishment of training facilities and recommending to A.C. of S.G-1 those organizations and individuals which should be directed to take instruction.

The local Service Park comes directly under the Division M.T.O. and its operation should receive a great deal of the time of the assistant in charge of maintenance. All repair work in the field must be expedited and careful discrimination and good judgment must be exercised in deciding what jobs should be handled by your Service Park Unit and what should *not* be handled but sent directly back to the nearest Overhaul Park. The class of repairs to be handled locally is clearly laid down in bulletins and lectures already in hand.

Following up requisitions on the nearest Advance Spare Parts Depot is another important duty of the Division M.T.O. and his Maintenance Assistant. All requisitions for M.T.C. material from all organizations in the Division must pass through his hands and he must be conversant with each unit's condition and requirements in order to pass on these requisitions intelligently. He should prevent excessive orders and overstocking, for as stated before the A.E.F. will never have all the spare parts and supplies it needs and there must be an equitable distribution throughout all commands in order to keep the maximum number of motor vehicles of the A.E.F. in service. A "tickler" system on requisitions will be a great help in getting action.

A very important function of a divisional M.T.O. is the selection of roads and routes in the area immediately back of the sector occupied by the division. These should be carefully studied with a view to shortening the hauls whenever possible. With the constant shifting of artillery and aircraft activities substitute roads should be carefully worked out and charted so that quick changes may be made. Bad road conditions should be reported promptly to the authorities charged with road maintenance.

M.T.O.'s are charged with the consolidation and forwarding of weekly reports showing exact condition of all motor vehicles and personnel attached to the division. This report is originally made out on M.T.C. Form No. 118 by all company and detachment commanders, consolidated by train commanders (if the company is part of a train—if not, it is forwarded direct to the Division M.T.O.) and then forwarded by the train or motor command to the Division M.T.O. who makes the final consolidation. The M.T.O.'s report is made out in quadruplicate. One copy is sent to the D.M.T.C., one to the M.T.O. of the corps of which the division is a part, one to the M.T.O. of the army and one is retained by the Division M.T.O. for his records.

It is absolutely necessary that this report be accurate and that it be sent forward promptly by all concerned. It provides the various headquarters to which copies are sent with all field information and important decisions and actions are made in accordance with the date which it contains. Its importance, therefore, is obvious.

When the Division is ordered to move to a new area, the M.T.O. must carefully work out all the details such as routes to be followed, points of loading and unloading, schedule and rate of travel, etc. This is perhaps one of his

most important duties and should be handled by him personally and not entirely by subordinates. There must be no confusion and no delay in departure or arrival. When all the preliminary details have been worked out and he has issued detailed instructions to cover every single vehicle and unit in the Division, the ablest assistant should be left in charge of the actual carrying out of the movement and proceed at once to the new area for a careful reconnaissance.

The parking spaces and billets for each unit and the location of the Service Park Unit should be determined. There should be located on a map of the area the best routes to be used by the Supply, Ammunitions, Engineer and Sanitary Trains and duplicate maps showing these routes should be prepared and handed to those concerned on their arrival.

It is apparent that the duties of the Division M.T.O. are very broad and cover everything touching upon Motor Transportation in the division. His responsibilities are great and the service he *can* render is practically unlimited. It requires a lot of hard work, the exercise of good judgment, and oftentimes of the "snap" variety, and a tremendous amount of tact.





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